

California High-Speed Train Project



Request for Proposal for Design-Build Services

RFP No.: HSR 11-16

Verification, Validation and Self-Certification

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Table of Contents

1	INTRODUCTION	1
1.1	Reference Standards	1
1.2	Scheduling.....	1
1.3	V&V Submittals.....	1
1.4	Self Certification Process Overview	2
1.5	Terms and Acronyms.....	2
2	PRODUCTS.....	3
2.1	Verification and Validation Plan.....	3
2.1.1	Verification and Validation Process.....	3
2.1.2	Requirements Management.....	4
2.1.3	Design Management.....	4
2.1.4	Interface Management.....	6
2.1.5	Inspection and Testing Program Management	7
2.1.6	Change Management	8
2.2	Requirements Management Tool	9
2.2.1	Parse the Contract for Technical Contract Requirements	9
2.2.2	Capture Technical Contract Requirements.....	10
2.2.3	Document Technical Contract Requirements	10
2.2.4	Analyze Technical Contract Requirements.....	11
2.2.5	Derive Technical Contract Requirements	11
2.2.6	Apportion Technical Contract Requirements	12
2.2.7	Trace Technical Contract Requirements	12
2.2.8	Manage Technical Contract Requirements.....	12
2.2.9	Verify Technical Contract Requirements	13
2.2.10	Validate Technical Contract Requirements.....	13
2.2.11	Reporting.....	14
2.3	Requirements Verification and Traceability Matrix.....	14
2.3.1	Submittals	16
2.4	Certifiable Items List	17
2.5	Contractor Verification and Validation Report.....	18
2.6	Contractor Verification and Validation Submittal.....	18
3	EXECUTION.....	19
3.1	Self-certification Process Overview	19
3.2	Contractor Verification and Validation Requirements	20
3.2.1	Contractor V&V Key Personnel	20
3.2.2	Verification and Validation Plan.....	20
3.2.3	Requirements Management Tool	21
3.2.4	Requirements Verification Traceability Matrix.....	21
3.2.5	Certifiable Items Lists	21
3.2.6	Verification and Validation Reports	21
3.3	Independent Checking Engineer and Independent Site Engineer	21
3.3.1	General ICE/ISE Requirements	21
3.3.2	ICE/ISE Role	22



3.3.3	ICE/ISE Qualifications	22
3.3.4	ICE/ISE Duties	23
3.3.5	ICE/ISE Independent Design Assessments and Analytical Design Checks.....	24
3.3.6	ICE/ISE Deliverables	25
3.3.7	Design Revisions.....	26
3.3.8	Independent Verification and Validation	26
3.3.9	Contractor and ICE/ISE Disagreement.....	26
3.4	Authority's Representative Review.....	26
3.5	V&V Submittals.....	27
4	APPENDIX A – INTEROPERABILITY ITEMS	31

Figures

FIGURE 1:	CONTRACTOR V&V SUBMITTAL.....	2
FIGURE 2:	SELF-CERTIFICATION PROCESS	19

Table

TABLE 1:	RVTM TEMPLATE.....	29
TABLE 2:	CIL TEMPLATE	30



1 Introduction

Verification and Validation (V&V) requirements for Contractor to demonstrate compliance with Technical Contract Requirements set forth in this Contract by provision of objective evidence.

Requirements for Contractor Self-Certification to certify that the contract submittals conform to Contract Requirements as detailed in the Contract and as reasonably inferred therefrom.

Requirements for Independent Verification and Validation (IV&V) performed by an Independent Checking Engineer (ICE) and Independent Site Engineer (ISE).

Unless otherwise noted, all requirements in this document have to be performed by the Contractor.

This section does not include the actual individual Contract Submittals, Quality Control/Assurance, Inspection, and Testing requirements for each Contract element. Refer to the applicable performance and standard specifications.

1.1 Reference Standards

- International Electrotechnical Commission (IEC)
 - IEC 10007 – Quality management system –Guidelines for configuration management
 - IEC 15288 – Life Cycle Management–System Life Cycle Processes
- Institute of Electrical and Electronics Engineers (IEEE)
 - IEEE 1220/IEC 26702 – Systems engineering–Application and management of the systems engineering process

1.2 Scheduling

- Include V&V submittals listed in Section 3.5 in Contract schedule.
- Add V&V activities as defined in Verification and Validation Plan in Contract schedule.

1.3 V&V Submittals

Add V&V submittals listed in Section 3.5 to the Contract Data Requirements List (CDRL).

Each Contract submittal shall be accompanied by a V&V submittal as defined in Section 2.6 and shown in Figure 1, identifying which Contract requirement it satisfies and explaining how the Contract requirement is met, inspected, or tested by the Contractor's design and construction.



V&V submittals include the Requirements Verification Traceability Matrix (RVTM), Certifiable Items List (CIL), and a V&V report explaining how the design meets the Technical Contract Requirements.

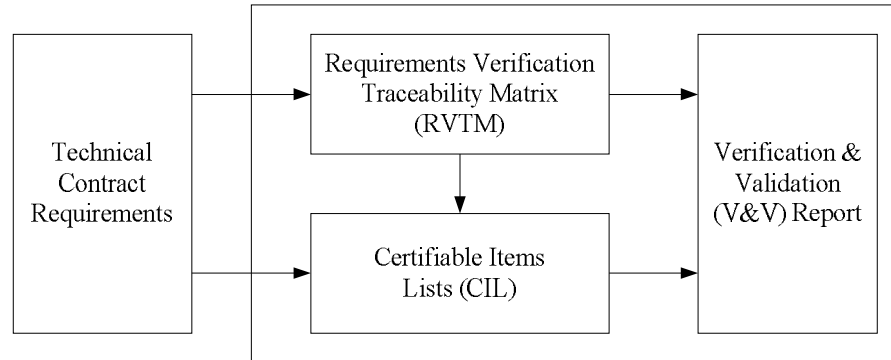


Figure 1: Contractor V&V Submittal

1.4 Self Certification Process Overview

Follow the Self-Certification Process as defined in Section 3.1.

1.5 Terms and Acronyms

Term	Definition
CDRL	Contract Data Requirements Lists
Certifiable Item	Contract Requirement that requires independent verification.
CIL	Certifiable Items List
Contract Requirement	Any part of the Contract that requires an action or deliverable to be performed by the Contractor.
Contract Submittals	Submittals other than V&V submittals as required in this Contract
EIR/S	Environmental Impact Report/Statement
Fitness for Purpose	A product is suitable for the intended purpose
HSR	High Speed Rail
IBS	Interface Breakdown Structure
ICE	Independent Checking Engineer
IM	Interface Management
ISE	Independent Site Engineer
PHA	Preliminary Hazard Analysis
RM	Requirements Management
RVTM	Requirements Verification Traceability Matrix
ROD	Record of Decision
SONO	Statement of No Objection
Technical Contract Requirement	Contract Requirement of a technical, design or construction nature.
TVA	Threat and Vulnerability Assessment
V&V	Verification and Validation



Validation	Confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use have been fulfilled
Verification	Confirmation by examination and provision of objective evidence that the specified requirements have been fulfilled
VVP	Verification and Validation Plan

2 Products

2.1 Verification and Validation Plan

Develop and implement a Contractor Verification and Validation Plan (VVP) for the project that addresses the sub-processes in the following sections.

The Contractor may choose to submit the V&V plan in individual management plans. Each management plan shall address as a minimum for each process:

- Contract life cycle phases (notice to proceed, design, construction, and testing/acceptance)
- Deliverables for each phase
- Activities for each deliverable
- Responsibility assignment matrix for deliverables and activities
- Tools and methods used
- Inputs used for each phase
- Stakeholder coordination
- Metrics used to measure and report progress

Submit the VVP as specified in Section 3.5.

2.1.1 Verification and Validation Process

Develop and implement a comprehensive verification and validation process to demonstrate how each Technical Contract Requirement is met during design, construction, and testing.

Base the V&V process on the general provisions of IEEE 1220/IEC 26702 "Systems engineering–Application and management of the systems engineering process" and follow the general provisions of IEC 15288 "Life Cycle Management–System Life Cycle Processes."

Tailor the V&V process for the purpose of a civil/structural project.

The V&V lead shall meet the requirements for Contractor Key Personnel as specified in Section 3.2.1.



2.1.2 Requirements Management

Develop and implement a comprehensive requirements management (RM) process, defining how the Technical Contract Requirements are parsed, captured, documented, derived, apportioned, traced, managed, verified, and validated.

Technical Contract Requirements are defined as Contract Requirements specifying the characteristics of the final Contract deliverable including related design, construction, inspection, testing, and acceptance requirements. Manage the Technical Contract Requirements Types, including the following:

- Operational requirements
- Safety requirements
- Security requirements
- Environmental requirements
- Reliability, availability, maintainability requirements
- Functional requirements
- Performance requirements
- Physical requirements
- Interface requirements
- Expandability requirements
- Logistics, support, other requirements

The RM lead shall meet the requirements for Contractor Key Personnel as specified in Section 3.2.1.

Manage Technical Contract Requirements in the RM tool as specified in Section 2.2.

Demonstrate compliance to Technical Contract Requirements using the RVTM as specified in Section 2.3.

Certify compliance to critical requirements using the CIL as specified in Section 2.4.

2.1.3 Design Management

Develop and implement a comprehensive design management process, defining how the Technical Contract Requirements are developed into the design.

Apply the design management process to infrastructure engineering disciplines and associated design elements, including the following:

- General design criteria and requirements



- Survey and mapping
- Clearances
- Track geometry
- Trackwork
- Intrusion protection
- Civil site design
- Drainage
- Utilities
- Geotechnical design
- Seismic design
- Structural design
- Tunnels
- Stations
- Support facilities
- Mechanical, electrical and plumbing
- Grounding and bonding
- Corrosion control

Develop a design breakdown structure, including the following:

- Engineering disciplines within Contract
- Design elements for each engineering discipline

Use RM process to apportion requirements to design breakdown structure. Demonstrate in design documents compliance with apportioned requirements.

The design management lead shall meet the requirements for Contractor Key Personnel as specified in Section 3.2.1.

Manage the design documents in the RM tool.

Demonstrate compliance to Technical Contract Requirements using the RVTM as specified in Section 2.3.

Certify compliance to critical requirements using the CIL as specified in Section 2.4.



2.1.4 Interface Management

This contract is part of the overall California High-Speed Train Project (the Project). Many external interfaces and dependencies exist between this contract and other Project contracts and stakeholders.

Develop and implement a comprehensive interface management (IM) process, defining how interfaces are identified, documented, specified, verified, and validated.

Create an interface register with the contents in an interface breakdown structure (IBS), including the following:

- Level 1: Future Project contracts interfacing with this Contract
- Level 2: Sub-systems of future Project contracts
- Level 3: Interfaces categories (e.g. loads, forces, clearances, spatial needs, etc.)
- Level 4: Actual interfaces

Follow the general outline of the interoperability items list as provided in Appendix A – Interoperability Items, and address as a minimum:

- General / system-wide
 - Environmental, including noise & vibration, reliability, availability, maintainability, etc.
- Operations & maintenance
 - Operations, maintenance, safety, security
- Rolling stock
 - HST trainsets
- Systems
 - Traction power, overhead contact system, automatic train control system, etc.
- Guideway (infrastructure), excluding trackwork
 - Engineering disciplines as defined in Section 2.1.3
- Trackwork
- Stations
- Storage and maintenance facilities (yards)
- External / third parties
 - Shared rail corridor, shared-use track, high/roadways, utilities, etc.



Manage the interfaces top-down, e.g. HST trainset axle loads shall be treated as a rolling stock interface being imposed on this Contract. Place the interface in the IBS in the future rolling stock category, see interface ID 1073 in Appendix A – Interoperability Items for more detail. The IM lead shall meet the requirements for Contractor Key Personnel as specified in Section 3.2.1.

Manage the interfaces and the interface register in the RM tool.

Demonstrate compliance to Technical Contract Requirements and identified interfaces using the RVTM as specified in Section 2.3.

Certify compliance to critical interfaces using the CIL as specified in Section 2.4.

2.1.5 Inspection and Testing Program Management

Develop and implement a comprehensive inspection and testing program, defining how Technical Contract Requirements are validated.

Develop individual inspection and test management plans, including the following:

- Prototype Testing
 - Use only products that have been proven in comparable high-speed-rail projects.
 - If new products are proposed, prototypes shall be built and type-tested prior to First Article Production.
 - Retain the services of an independent test lab demonstrating and certifying compliance to the Technical System Requirements and Final Design.
- First Article Compliance Inspection
- Production Run Testing (i.e., at supplier facility during manufacturing)
- Factory Acceptance
- Inspections
- Site Installation
- Site Acceptance
- Integration Testing
- Interoperability Test
- Start-Up Testing
- Pre-Revenue Testing
- Reliability, Availability, Maintainability Testing
- Safety Certification
- Security Certification



For each inspection and test, address as a minimum the following:

- Inspection and test preparation
- Inspection and test coverage
- Inspection and test execution
- Inspection and test reports
- Inspection and test failure reporting, analysis and corrective action system
- Regression inspection and testing

The lead for inspection and test program management shall meet the requirements for Contractor Key Personnel as specified in Section 3.2.1.

Manage the inspections, testing, and acceptance in the RM tool.

Demonstrate compliance to Technical Contract Requirements and design using the RVTM as specified in Section 2.3.

Certify compliance to critical requirements and interfaces using the CIL as specified in Section 2.4.

2.1.6 Change Management

Refer to Book 2, Part B for overall Contract Change Management.

Develop and implement a comprehensive change management process, defining how changes to the Technical Contract Requirements Baseline are managed.

Follow the general provisions of the latest version ISO/IEC 10007 "Quality management systems–Guidelines for configuration management" and as stipulated by the standards listed in this section.

Address as a minimum the following:

- Configuration identification, including Technical Contract Requirements, design, construction, and testing/acceptance baselines
- Configuration control, including impact analysis and approval procedures including Configuration Control Boards
- Configuration status accounting
- Configuration audits

Apply change management process to ensure Contract integrity and conformance with the HSR program.



The change management lead shall meet the requirements for Contractor Key Personnel as specified in Section 3.2.1.

Manage the changes in the RM tool.

Demonstrate compliance to the Technical Contract Requirements using the RVTM as specified in Section 2.3.

Certify compliance to critical items using the CIL as specified in Section 2.4.

2.2 Requirements Management Tool

Parse, capture, document, analyze, derive, apportion, trace, manage, verify, and validate Technical Contract Requirements using an RM tool.

Manage the design, inspection, testing and acceptance documents in the RM tool to allow the automatic export of:

- Requirements Verification Traceability Matrices as specified in Section 2.3.
- Certifiable Items Lists as specified in Section 2.4.

The RM tool requirements:

- The RM tool shall be IBM Rational DOORS, version 9.3 or later
- Provide 3 RM tool floating licenses to the Authority's Representative as defined in the Submittals Section 3.5.
- Follow the procedures of the Verification and Validation Process as defined in this section.
- Train RM tool users in the operation and configuration of the features of the RM tool required enabling them to perform the requirements of this section.
- Enable web access to the RM tool and provide the Authority's Representative with full real-time readability access.
- Create Requirements Verification Traceability Matrices and Certifiable Items Lists directly from the RM tool.
- Submit the RM tool database as defined in Section 3.5.

2.2.1 Parse the Contract for Technical Contract Requirements

- General provisions, special provisions and scope of work and appendices
- Design Criteria Manual
- Directive Drawings
- Standard specifications and standard drawings



- Special specifications
- Preliminary engineering documents
- Other Contract documents containing Technical Contract Requirements, including manuals, reports, drawings, procedures, policies, permits, agreements.

2.2.2 Capture Technical Contract Requirements

- General provisions, special provisions and scope of work and appendices
 - Capture applicable Technical Contract Requirements
- Design Criteria Manual
 - Capture the design criteria.
 - Assess applicability and identify each criterion that is determined to not be applicable to the Contract using RM tool attributes.
- Directive Drawings
 - Capture the directive drawings, use RM tool attributes to identify applicable Technical Contract Requirements
 - If directive drawings support design criteria, trace the design criteria to the directive drawings
- Standard specifications and drawings
 - Capture applicable Technical Contract Requirements.
- Special specifications
 - Capture applicable Technical Contract Requirements.
- Other Contract documents containing Technical Contract Requirements
 - Capture applicable Technical Contract Requirements.
- For each Technical Contract Requirement
 - Capture Contract document reference
 - Capture Contract document section reference
 - Capture Technical Contract Requirement language
 - Do not capture more than 1 Technical Contract Requirement in 1 RM tool requirement
 - Assign unique requirements identifier

2.2.3 Document Technical Contract Requirements

- Store and manage the Technical Contract Requirements in the RM tool.



2.2.4 Analyze Technical Contract Requirements

- Analyze each Technical Contract Requirement and assign one or more requirement type attributes. Requirements types are defined in Section 2.1.2.

2.2.5 Derive Technical Contract Requirements

- Advance Technical Contract Requirements to the 100 percent design level in the RM tool, including:
 - General/typical requirements
 - Site specific requirements
- Develop specific, measurable, achievable, and realistic derived requirements for this Contract that can be verified and validated. Document and capture implied requirements, transform performance level requirements and create sub-requirements as required.
- Advance Technical Contract Requirements with the means of supporting documentation, including:
 - Requests for information
 - Studies
 - Analyses, including:
 - Design and code analyses
 - Site-specific hazard analyses
 - Calculations
 - Reports, including the following:
 - Baseline design reports
 - Aesthetic design and review reports
 - Value engineering reports
 - Hydrology and hydraulics reports
 - Geotechnical and foundation reports
 - Structure reports
 - Seismic design reports
 - Phase II hazardous materials
 - Design workshop
 - Agreements
 - Letters
 - Directions



- Meetings minutes
 - Site inspections
- Parse supporting documentation and capture, document and analyze derived applicable requirements as Technical Contract Requirements.

2.2.6 Apportion Technical Contract Requirements

- Allocate the Technical Contract Requirements to the applicable engineering disciplines and design elements using the RM tool. Engineering disciplines are defined in Section 2.1.3.
- If Technical Contract Requirements are apportioned to 2 or more engineering disciplines or design elements, identify and manage the interfaces using the Interface Management process.

2.2.7 Trace Technical Contract Requirements

- Provide full traceability using the RM tool from the Technical Contract Requirements to the following documents:
 - Derived requirements including supporting documentation
 - Apportioned requirements
 - Baseline design reports
 - Design documents
 - Construction documents
 - As-built drawings and specifications
 - Interfaces
 - Pending and approved changes including supporting documentation
- Tracing direction shall be top-down, starting with the Technical Contract Requirements.

2.2.8 Manage Technical Contract Requirements

- Baseline the Technical Contract Requirements and associated design and construction documents:
 - After they have been imported into the RM tool
 - After submittal of the Initial and Final Baseline Design Report
 - After milestone design submittals (60 percent, 90 percent, Ready for Construction)
- Follow the Change Management Process for changes to Technical Contract Requirements.
- Add and manage Technical Contract Requirements from Contract and other sources during the life of the Contract as defined in this section, including:



- Environmental requirements and mitigations as found in the environmental documents including EIR/S, Record of Decision (ROD), permits and approvals
- Safety requirements including hazard mitigations
 - An initial set of Preliminary Hazard Analysis (PHA) mitigations is provided in Book 4
- Security requirements including threat mitigations
 - An initial set of Threat and Vulnerability Assessment (TVA) mitigations is provided in Book 4
- Interoperability items
 - An initial set of interoperability items are provided as part of Appendix A – Interoperability Items.
- Public and third-party outreach, including law enforcing agencies, fire departments, emergency medical services, utilities
- Reviews, including peer reviews
- Directions, letters, meetings, other

2.2.9 Verify Technical Contract Requirements

- Demonstrate compliance to Technical Contract Requirements by provision of objective evidence that:
 - Derived requirements meet Technical Contract Requirements.
 - Apportioned requirements meet Technical Contract Requirements.
 - Design documents including typical and site specific construction and shop drawings and specifications meet Technical Contract Requirements.
 - Construction drawings and specifications meet design drawings and specifications.
 - Construction meets construction drawings and specifications.
 - As-built drawings and specifications meet Technical Contract Requirements.
 - Inspection plans and procedures meet Technical Contract Requirements.
 - Test and acceptance plans and procedures meet Technical Contract Requirements.
- Demonstrate compliance to Technical Contract Requirements using the RVTM as specified in Section 2.3.
- Certify compliance to critical requirements using the CIL as specified in Section 2.4.

2.2.10 Validate Technical Contract Requirements

- Demonstrate compliance to Technical Contract Requirements by provision of objective evidence that:



- Construction items meet Technical Contract Requirements as documented in inspection reports.
- Construction items meet Technical Contract Requirements as documented in inspection test and acceptance reports.
- Demonstrate compliance to Technical Contract Requirements using the RVTM as specified in Section 2.3.
- Certify compliance to critical requirements using the CIL as specified in Section 2.4.

2.2.11 Reporting

- Configure the RM tool to allow filtering and exporting for type of requirements, design, construction, testing, and acceptance documents, including the following:
 - Technical Contract Requirements
 - Derived requirements including supporting documentation
 - Apportioned requirements
 - Design drawings and specifications
 - Construction drawings and specifications
 - Inspection plans, procedures, and reports
 - Test and acceptance plans, procedures, and reports
 - As-built drawings and specifications
 - Interfaces
 - Pending and approved changes including backup documentation
- When filtered, configure the RM tool to identify incoming and outgoing traces and to export as an RVTM or a CIL as defined in sections 2.3 and 2.4.

Submit the RM tool database to the Authority's Representative as defined in Section 3.5.

2.3 Requirements Verification and Traceability Matrix

Demonstrate compliance to Technical Contract Requirements using the RVTM.

Manage the RVTM in the RM tool. Allow the RVTM to be filtered and exported in Microsoft Word, Excel and Adobe PDF format.

Use the RVTM template as provided in Table 1. Tracing shall be continuous, starting with the Technical Contract Requirements, as shown in the RVTM template.

Provide an RVTM that identifies for each Technical Contract Requirement the appropriate section references to the design, construction, and testing & acceptance documents. Appropriate



section references to these documents shall explain how each Technical Contract Requirement is met, inspected, tested and accepted by the Contractor's design and construction, including the following:

- Technical Contract Requirement
 - Unique requirements identifier
 - Contract document reference
 - Contract document section reference
 - Technical Contract requirement language
- Design
 - Derived requirements
 - Apportioned requirements
 - Allocation to engineering disciplines/design elements
 - Design document references
 - Design document section references
- Construction
 - Construction document reference
 - Construction document section reference
 - Inspection plan, procedure and report document references
 - Inspection plan, procedure and report document section references
 - As-built document reference
 - As-built document section reference
- Testing and acceptance
 - Test and acceptance plan, procedure and report document references
 - Test and acceptance plan, procedure and report document section references

When supplying the references, apply the lowest practical level of precision, for example:

- Unique drawing number
- Smallest practical numbered section in a document.

The exported RVTM hardcopy shall be readable by a human being without the need of the RM tool. Provide an uncluttered RVTM without any irrelevant information such as RM tool folder and path names, unrelated attributes, or similar.



Reflect in the RVTM any changes in design, development, construction, inspection and testing that have been approved by the Authority's Representative.

The use of Technical Exchange Meetings shall be used to apprise the Authority's Representative of the development of the RVTM.

2.3.1 Submittals

Provide an exported RVTM hardcopy and an electronic copy in Microsoft Excel format to the Authority's Representative with every V&V submittal.

2.3.1.1 Design

- Preliminary and Final Baseline Design Report
 - Submit RVTM with Technical Contract Requirements captured, analyzed, derived, and apportioned to engineering disciplines and design elements.
 - RVTM shall include complete list of Technical Contract Requirements fully traced to the baseline design report. Using RM tool attributes, clearly demonstrate the following:
 - Which Technical Contract Requirements have been baselined
 - Which Technical Contract Requirements have not been baselined
- 60 Percent Design
 - Submit RVTM with Technical Contract Requirements captured, analyzed, derived, and apportioned to engineering disciplines and design elements.
 - Demonstrate that each Technical Contract Requirements has been sufficiently advanced (derived) and allocated (apportioned) and which design document (CDRL) is used to demonstrate compliance.
- 90 Percent Design
 - Submit RVTM with Technical Contract Requirements fully traced to applicable design documents including section references.
- Other Design Submittals
 - Submit RVTM with apportioned Technical Contract Requirements fully traced to applicable design documents including section references applicable to the design element.

2.3.1.2 Construction

- Ready for Construction
- Submit RVTM with Technical Contract Requirements fully traced to applicable design documents including section references. Inspection plans, procedures and reports



- Submit RVTM with apportioned Technical Contract Requirements fully traced to applicable design and inspection documents including section references applicable to the inspected construction element.
- Test/acceptance plans, procedures and reports:
 - Submit RVTM with apportioned Technical Contract Requirements fully traced to applicable design, inspection, testing and acceptance documents including section references applicable to the test/accepted construction element.

2.3.1.3 As-Built

- Submit RVTM with Technical Contract Requirements fully traced to as-built documents including section references.

2.4 Certifiable Items List

Demonstrate compliance to critical items using CILs. Critical items are a subset of the Technical Contract Requirements, including the following:

- Environmental requirements and mitigations as found in the environmental documents including EIR/S, Record of Decision (ROD), permits and approvals
- Safety requirements including hazard mitigations
- Security requirements including threat mitigations
- Interoperability items with other Project contracts

Manage the CIL in the RM tool. Allow the CIL to be filtered by type of critical item and exported in Microsoft Word, Excel and Adobe PDF format.

Use the CIL template as provided in Table 2. An initial set of critical items will be provided as part of the Contract. Refer to Section 2.2, Requirements Management Tool, for details. Coordinate with Authority's Representative and managers of the critical items specified above to populate and manage the CIL.

Flag all Technical Contract Requirements that are critical items using RM tool attributes.

Maintain the list of critical items during the life of the Contract. Treat any item as a Technical Contract Requirement and follow directions in the RM tool as specified in Section 2.2, including capturing, documenting, analyzing, deriving, apportioning, tracing, managing, verifying, and validating of critical items. Tailor Certifiable Items Lists as needed for the specific certification process, such as for Safety and Security certification, including management of PHAs and TVAs.

Develop the CIL based on the RVTM, with extra columns or fields to include the date and initials of the verifier, certifying that the critical item has been incorporated into the design, inspected, tested, and accepted as appropriate at each stage of development.



Reflect in the CIL any changes in design, development, and testing that have been approved by the Authority's Representative.

The use of Technical Exchange Meetings shall be used to apprise the Authority's Representative of the development of the CIL.

Submit an exported CIL hardcopy and an electronic copy to the Authority's Representative as defined in Section 3.5.

2.5 Contractor Verification and Validation Report

Provide a V&V report that accompanies every contract submittal.

Use the report to provide an executive summary and certification of compliance with Technical Contract Requirements. Provide additional explanation as necessary on how Technical Contract Requirements are met, inspected, tested, and accepted by the Contractor's design and construction in addition to information provided by the RVTM or CILs.

If the submittal is in full compliance with the Technical Contract Requirements, no further explanation is required.

The Contractor may choose to provide the executive summary and certification of compliance as part of the submittal letter.

2.6 Contractor Verification and Validation Submittal

Provide a V&V submittal with every contract submittal.

Contractor V&V submittal includes the following:

- RM tool database copy as defined in Section 2.2
- RVTM as defined in Section 2.3
- CILs as defined in Section 2.4
- Contractor V&V report as defined in Section 2.5

The Contractor V&V submittal shall enable the Independent Checking Engineer and Independent Site Engineer (Section 3.3) to perform a full compliance check against the Technical Contract Requirements.

The Contractor V&V submittal shall enable the Authority's Representative (Section 3.3.9) to perform a compliance review against the Technical Contract Requirements.



3 Execution

3.1 Self-certification Process Overview

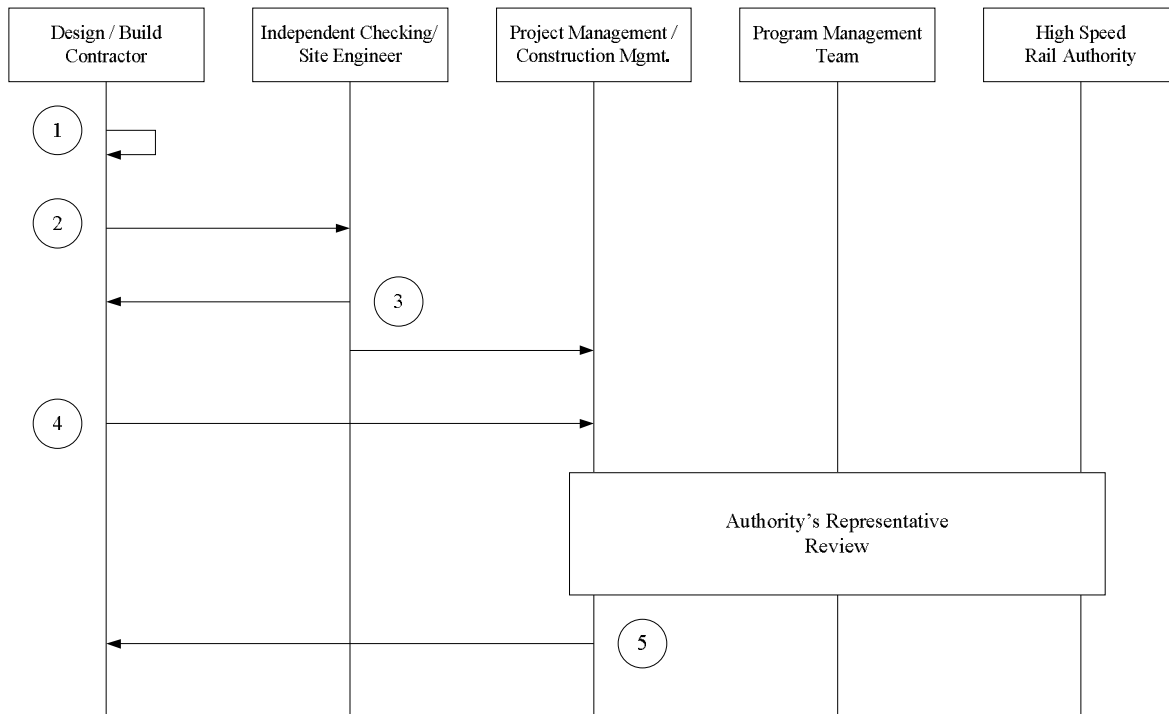


Figure 2: Self-Certification Process

Follow the self-certification process as presented in Figure 2.

1. Contractor shall prepare contract submittal (including design, construction, inspection and test submittals) as specified in the Contract and shall perform quality procedures as stipulated by the Contract. Contractor shall self-certify compliance with Contract Requirements and fitness for purpose.
2. Contractor shall submit contract submittal together with Contractor V&V submittal (Section 2.6) to Independent Checking Engineer (ICE) and Independent Site Engineer (ISE).
3. Independent Checking Engineer and Independent Site Engineer shall assess and evaluate the contract submittal in order to be able to certify that the design/construction meets the Contract Requirements as detailed in the Contract and as reasonably inferred therefrom. ICE/ISE shall submit an assessment report and certification to the Authority's Representative with a copy to the Contractor.
4. Contractor shall submit contract submittal, including self-certification, Contractor V&V submittal, ICE/ISE assessment report, and certification to the Authority's Representative.



5. The Authority's Representative will perform audit and re-review as required and issue Statement of No Objection (SONO), if given, based on upon audit and additional review results and ICE/ISE assessment report and certificate.

3.2 Contractor Verification and Validation Requirements

3.2.1 Contractor V&V Key Personnel

Employ only professionals with at least 10 years of experience in the stated field of expertise for key positions with a proven track record as supported by their resumes:

- Federal projects with Federal Transit Administration or Federal Rail Administration oversight
- Design/Build contracts
- Systems Engineering
- Verification and Validation

The positions listed below shall be the minimum to be considered V&V key positions:

- Verification and validation management
- Requirements management
- Design management
- Interface management
- Inspection and testing management
- Change management

The Authority's Representative may designate other positions as V&V key positions or reduce the number of such positions at any time during the Contract.

Do not share key positions between more than 1 person. One person can hold more than one key position.

Submit resumes of key employees to the Authority's Representative.

3.2.2 Verification and Validation Plan

Prepare and submit a Contractor VVP in compliance with the requirements defined in Section 2.1.

Follow the V&V procedures, as defined in Section 2.1 and as documented in the Contractor VVP, including the following:

- Verification and validation management



- Requirements management
- Design management
- Interface management
- Inspection and testing management
- Change management

3.2.3 Requirements Management Tool

Procure an RM tool and follow directions in compliance with the requirements defined in Section 2.2.

3.2.4 Requirements Verification Traceability Matrix

Prepare and submit RVTMs in compliance with the requirements defined in Section 2.3.

3.2.5 Certifiable Items Lists

Prepare and submit CILs in compliance with the requirements defined in Section 2.4.

3.2.6 Verification and Validation Reports

Prepare and submit V&V reports in compliance with the requirements defined in Section 2.5.

3.3 Independent Checking Engineer and Independent Site Engineer

Contractor shall retain the services of qualified independent engineering consulting firm(s) to serve as its Independent Checking Engineer (ICE) and Independent Site Engineer (ISE) performing independent verification and validation (IV&V) for the duration of the Contract. Every submittal shall be fully checked by the ICE during design and the ISE during construction before submittal to the Authority.

The Contractor may choose to divide the checking and site engineering services between two professional engineering firms. Contractor shall seek approval from the Authority's Representative of the independent engineering consulting firm(s) prior to retention.

3.3.1 General ICE/ISE Requirements

The ICE/ISE shall not be associated in any way with or be a subsidiary or affiliate of any other firm engaged by the Contractor to perform any other work under this Contract. The ICE/ISE shall not be involved in actually producing design documents or conducting construction site supervision for the Contract.

The ICE/ISE shall not work directly for nor report to the Contractor's Project, Engineering/Design, Construction or Test Manager. The ICE/ISE shall be directly responsible to and report to a senior management or similar level of the Contractor's organization not directly



responsible for engineering/design, construction or testing. Furthermore, the ICE/ISE shall report directly to the Authority's Representative.

The ICE/ISE staff shall be located in California for the duration of their work except for ICE/ISE staff required to perform ICE/ISE function at sites of work located elsewhere. The ICE/ISE shall be represented at all times by staff whose seniority and experience are appropriate to the Works, and whose representation is available as necessary and as required by the Authority's Representative for discussions and meetings with the Authority's Representative.

3.3.2 ICE/ISE Role

The ICE/ISE shall assess and evaluate the Contractor submittals in order to be able to certify that the design and construction meets the Contract Requirements as detailed in the Contract and as reasonably inferred therefrom.

The ICE/ISE shall warrant such certification to the Contractor and to the Authority's Representative.

3.3.3 ICE/ISE Qualifications

The ICE/ISE firm shall:

- Be a well-established professional firm (20+ years) with experience in the rail transportation industry with Federal Transit Administration or Federal Rail Administration oversight
- Meet the same professional registration requirements as the designers
- Have relevant project experience as a primary designer in:
 - Design and construction in similar conditions
 - Seismic design for viaducts/bridges
 - Deep foundations and earthwork design in soft ground
 - Geotechnical earthquake engineering analysis and design
- Have adequate resources to meet the requirements of the Contract
- Have been involved in major projects within the past 5 years involving work of similar nature as that represented by this Contract
- Have previous experience in an IV&V role
- Have academically and professionally qualified staff assigned to the Contract, with an adequate level of experience, including the construction phase, on a High-Speed Railway as specified in Section 3.2.1
- Have a local site office established with a senior management representative always available within 24 hours notice; and
- Have a QA/QC system that is based upon ISO 9001 standards



3.3.4 ICE/ISE Duties

The ICE/ISE's verification and validation activities shall include, as a minimum, assessment and evaluation of:

- Contract management related submittals
- Design submittals, including the following:
 - Preliminary and final baseline design report
 - 60 percent design
 - 90 percent design
 - Other design submittals
- Construction
 - Ready for construction documents
 - Inspection plans and procedures
 - Witness of inspections and check inspection reports
 - Test and acceptance plans and procedures
 - Witness of testing/acceptance and check testing/acceptance reports
- As-built
 - As-built documents
- Design changes

The ICE/ISE shall conduct its assessment and evaluation of design and construction such that the ICE/ISE can certify to the Contractor and to the Authority's Representative that the design and construction satisfies the Contract requirements, including those for the following:

- Accuracy
- Adequacy
- Conformance to standards of practice
- Compliance with codes and standards
- Cost effectiveness
- Quality, and
- Fitness for purpose and/or function as specified and/or implied in the Contract.

The ICE/ISE shall check that section references provided in the RVTM and CILs created by the Contractor demonstrate compliance to the following Technical Contract Requirement and critical items:



- Derived and apportioned requirements conform to Technical Contract Requirements
- Design documents including reports, analyses, typical and site specific construction and shop drawings and specifications conform to Technical Contract Requirements
- Construction drawings and specifications conform to design drawings and specifications
- Construction items conforms to construction drawings and specifications
- As-built drawings and specifications conform to construction items
- Inspection plans and procedures meet Technical Contract Requirements
- Inspection reports demonstrate Construction items conform to Technical Contract Requirements
- Test and acceptance plans and procedures meet Technical Contract Requirements
- Test and acceptance reports demonstrate Construction items conform to Technical Contract Requirements

3.3.5 ICE/ISE Independent Design Assessments and Analytical Design Checks

The ICE/ISE shall carry out independent design assessments and analytical design checks as addressed in the following sub-sections.

3.3.5.1 Independent Design Assessments

The ICE/ISE shall the review the Contractor submittals for compliance with the Contract as specified in Section 3.3.4, taking into consideration the proposed method of construction, and shall include the following areas:

- Loads
- Codes and standards
- Methods of analysis
- Computer software and its validation
- Interface requirements
- Maintenance requirements
- Materials and material properties
- Durability requirements
- Fatigue performance

3.3.5.2 Independent Analytical Check

The ICE/ISE shall use separate calculations (without reference to Contractor's calculations) to establish the structural adequacy and integrity of structural members, including the following:

- The structural geometry and modeling



- Material properties
- Member/section properties
- Loading intensities
- Structural boundary conditions

The ICE/ISE shall sign and seal all independent structural calculations.

3.3.6 ICE/ISE Deliverables

- Assessment Plan, including the following:
 - Contract life cycle phases (notice to proceed, design, construction, and testing/acceptance)
 - Deliverables for each phase
 - Activities for each deliverable
 - Responsibility assignment matrix for deliverables and activities
 - Tools and methods used
 - Inputs used for each phase
 - Stakeholder coordination
 - Metrics used to measure and report progress
- Assessment Report and Certificates with each contract submittal
- Monthly Progress and Status Report, including:
 - Progress achieved in the month
 - Assessments performed in the month
 - Work schedule for the following month
 - Resource availability and deployment in the month
 - Resource availability and proposed deployment for the following month
 - Key issues for comment, discussion or Authority Representative's immediate attention comments
 - Recommendations
- Quarterly Progress and Status Report, including the following:
 - A summary report on the assessments completed during the quarter
 - A summary of any problems resolved during the quarter
 - A summary of outstanding issues and proposed follow-up action
 - A commentary on verification and validation issues



- Outlook on IV&V issues for the following quarter
- Overall comments and recommendations

3.3.7 Design Revisions

Any changes to design or construction elements already checked by the ICE/ISE shall be dealt with as an entirely new submission and shall be re-checked by the ICE/ISE.

3.3.8 Independent Verification and Validation

The independent verification and validation by the ICE/ISE shall not relieve the Contractor from carrying out all the checks and reviews that a professional and prudent Contractor would normally carry out on the type of work which is actually being designed.

3.3.9 Contractor and ICE/ISE Disagreement

If at any time the Contractor and the ICE/ISE have any significant disagreement, regardless whether it is later resolved, the ICE/ISE shall be under a duty to report that fact as soon as possible in the next Progress Report to the Authority's Representative.

3.4 Authority's Representative Review

An Authority's Representative review does not define a hold point. The Contractor may proceed on his own risk. Hold points or approvals might be required for regulatory/legislative review or other reasons as pointed out elsewhere in the Contract.

Upon submittal the Authority's Representative will perform an audit of the Contractor's and Independent Checking Engineer and Independent Site Engineer's adherence to the verification and validation process and re-check the submittal as deemed necessary.

The Authority's Representative will provide a review report for each submittal. Where the Contract Documents indicate that a Contractor submittal is subject to a SONO, the Authority will provide one of the following responses:

- SONO;
- SONO with comments; or
- Statement of objection with comments.

If any Contractor submittal receives a SONO with comments, the Contractor shall address those comments and notify the Authority how it addressed those comments within 14 days after receipt of the Authority's SONO with comments, but is not required to resubmit the underlying document. If any Contractor submittal receives a statement of objection with comments, the Contractor shall address those comments and resubmit the underlying document within 14 days of receipt of the Authority's statement of objection with comments.



Prior to issuance of a design review report, the Authority's Representative may require consultations with the ICE/ISE or Contractor for the various disciplines involved in the part of the work under review. The Contractor shall ensure that the relevant staff is available to participate in such consultations.

The Authority's Representative may request additional reviews as considered necessary to ensure a continued and uniform consistency in the quality and effective incorporation of revisions to submittals and/or the Contractor may request additional reviews to facilitate release of designs for construction.

Supplemental, supporting information to the submittal under review may be requested by the Authority's Representative. The Contractor shall supply such information quickly and efficiently. Provided the requested information is such that it would reasonably be expected to be generated for the design of the submittal to be complete for the designated stages of design or construction, the Contractor shall not be entitled to any increase in Contract Price or extension of time for producing the said supporting information and such additional time as required by the Authority's Representative to complete the review process.

The Authority's Representative may require the Contractor to re-submit the submittal for review where the information submitted is considered insufficient to conduct a proper review or actions arising from the review require significant revisions.

The time and cost impacts of re-submissions or revisions arising from the reviews and caused by Contractor's non-compliance with the Contract requirements or inadequacy in completeness of the Submittal, including the time taken for the Authority's Representative to review the revisions, shall be borne by the Contractor.

3.5 V&V Submittals

Section	Deliverable	Timeframe
V&V Process Management		
2.1	VVP – Draft	60 days after NTP
	VVP – Final	90 days after NTP
	VVP – Update	Other design submittals
2.2	RM Tool – Floating Licenses	30 days after NTP
	RM Tool – Database	Monthly
3.2	Key Personnel Resumes	Mobilization phase and prior to hiring
3.3	ICE/ISE Assessment Plan – Draft	60 days after NTP
3.3	ICE/ISE Assessment Plan – Final	90 days after NTP
3.3	ICE/ISE Monthly Progress and Status Report	Monthly
3.3	ICE/ISE Quarterly Progress and Status Report	Quarterly
Baseline Design Report Submittals		
2.2	RM Tool Database Copy	Baseline design report submittal



2.3	RVTM – Technical Contract Requirements	Baseline design report submittal
2.4	CIL – Critical Items	Baseline design report submittal
2.5	V&V Report	Baseline design report submittal
3.1	Contractor Self Certification	Baseline design report submittal
3.3	ICE/ISE Assessment Report and Certificate	Baseline design report submittal
Design Milestone Submittals		
2.2	RM Tool Database Copy	Milestone design submittals
2.3	RVTM – Technical Contract Requirements	Milestone design submittals
2.4	CIL – Critical Items	Milestone design submittals
2.5	V&V Report	Milestone design submittals
3.1	Contractor Self Certification	Milestone design submittals
3.3	ICE/ISE Assessment Report and Certificate	Milestone design submittals
Other Submittals		
2.2	RM Tool Database Copy	Other design submittals
2.3	RVTM – Apportioned Requirements	Other design submittals
2.4	CIL – Apportioned Critical Items	Other design submittals
2.5	V&V Report	Other design submittals
3.1	Contractor Self Certification	Other design submittals
3.3	ICE/ISE Assessment Report and Certificate	Other design submittals
Construction Submittals: Plans, Procedures, and Reports		
2.2	RM Tool Database Copy	Construction submittals
2.3	RVTM – Apportioned Requirements	Construction submittals
2.4	CIL – Apportioned Critical Items	Construction submittals
2.5	V&V Report	Construction submittals
3.1	Contractor Self Certification	Construction submittals
3.3	ICE/ISE Assessment Report and Certificate	Construction submittals
As-Built Submittal: Plans, Procedures, and Reports		
2.2	RM Tool Database Copy	As-built submittals
2.3	RVTM – Apportioned Requirements	As-built submittals
2.4	CIL – Apportioned Critical Items	As-built submittals
2.5	V&V Report	As-built submittals
3.1	Contractor Self Certification	As-built submittals
3.3	ICE/ISE Assessment Report and Certificate	As-built submittals



Table 1: RVTM Template

Technical Contract Requirement				Final Design					Construction		Testing/Acceptance	
				Requirements		Design						
Req. ID	Doc. ID	Document Section	Requirements Text	Derived Requirements	Apportioned Requirements	Allocation	Doc. ID/Name	Section	Doc. ID/Name	Section	Doc. ID/Name	Section
1	Design Criteria	4.4.5.3 Unbalanced Superelevation	The maximum unbalanced superelevation (Eu) shall be limited to 3 inches	N/A	N/A	Track Geometry	Drawing Set (e.g., Plan & Profile)	Drawing #	...	...	...	...
2	Design Criteria	5.8.2 Subballast or Asphalt Underlayment	The thickness shall be determined by analysis of the support required.	The thickness shall be xxx inches.	N/A	Track	Report ...	Section #	...	...	...	...
							Cross Section (Typical)	Drawing #	N/A	N/A	...	...
							Cross Section (Site Specific)	Drawing #	Drawing Set (Released for Construction)	Drawing #	...	...
									Inspection (Plan, Procedure, Report)	Section #	...	...
									Drawing Set (As Constructed)	Drawing #	...	...
									...		Test/Acceptance (Plan, Procedure, Report)	Section #
3	Design Criteria	1.9 Climatic Conditions	Climatic conditions necessary for design, including those that are site-specific, shall be researched and considered by the designer	The design wind speed shall ...	Wind loads on structures shall consider the design wind speed (velocity) as defined ...	Structures	Report ...	Section #	...	...	...	...
4	PHA	1.1.1.4 Derailment due to Washout	Perform hydraulics analysis and incorporate results into sub-grade design, slope protection, and setting of profile.	Hydraulics analysis shall ...	N/A	Geotech	...	...	...	...	...	...
					Sub-grade shall ...	Track	...	...	...	...	...	...
					Slope protection shall ...	Civil		...	...	...	...	...
					Setting of profile shall ...	Track Geometry		...	...	...	...	...
			Install appropriate drainage.	Drainage system shall ...	...	Drainage	...	...	...	...	...	...
			Inspection and maintenance of drainage systems.	...	...	O&M	...	...	...	...	...	...
			Identification and monitoring by O&M of potential hazardous locations.	...	...	O&M	...	...	...	...	...	...
Notes: RVTM template to be used by Contractor Content for illustration purposes only For detailed RVTM requirements refer to Contract Follow document control procedures for header and footer						Legend: Req. Requirement Doc. Document ID Identifier						

Table 2: CIL Template

Technical Contract Requirement				Final Design						Construction		Testing/Acceptance	
				Requirements		Design			Certification		Certification		Certification
Req. ID	Doc. ID	Document Section	Requirements Text	Derived Requirements	Apportioned Requirements	Allocation	Doc. ID/Name	Section	Certified By & Date	Content as per RVTM	Certified By & Date	Content as per RVTM	Certified By & Date
1	PHA	1.1.1.4 Derailment due to Washout	Perform hydraulics analysis and incorporate results into sub-grade design, slope protection, and setting of profile.	Hydraulics analysis shall ...	N/A	Geotech	...	...	...	...	...	...	...
					Sub-grade shall ...	Track	...	...	...	...	...	...	...
					Slope protection shall ...	Civil		...	...	...	...	...	...
					Setting of profile shall ...	Track Geometry		...	...	...	...	...	...
			Install appropriate drainage.	Drainage system shall ...	...	Drainage	...	...	...	...	...	...	...
			Inspection and maintenance of drainage systems.	...	...	O&M	...	...	...	...	...	...	...
			Identification and monitoring by O&M of potential hazardous locations.	...	...	O&M	...	...	...	...	...	...	...
Notes: CIL template to be used by Contractor Content for illustration purposes only For detailed CIL requirements refer to Contract Follow document control procedures for header and footer						Legend: Req. Requirement Doc. Document ID Identifier							



4 Appendix A – Interoperability Items

This appendix contains an initial list of Interoperability Items. It is preceded by a table of contents of the list, and followed by a legend of abbreviations.

Contents of Interoperability Items List

1	GENERAL	37
1.1	Environmental.....	37
1.1.1	Hazardous Conditions	37
1.1.1.1	Interfaces with Guideway (excl. Trackwork).....	37
1.1.1.1.1	Interface between GEN Seismic Event and GWY Infrastructure.....	37
1.1.2	Fault Zones	37
1.1.2.1	Interfaces with Guideway (excl. Trackwork).....	37
1.1.2.1.1	Interface between GEN Fault Zones and GWY Infrastructure.....	37
1.2	Reliability, Availability, Maintainability & Safety	37
1.2.1	Reliability & Availability	37
1.2.1.1	Interfaces with Guideway (excl. Trackwork).....	37
1.2.1.1.1	Interface between GEN Reliability & Availability Targets and GWY Infrastructure.....	38
2	OPERATIONS & MAINTENANCE.....	38
2.1	Operations	38
2.1.1	Train Operating/Service Plan.....	38
2.1.1.1	Interfaces with Guideway (excl. Trackwork).....	38
2.1.1.1.1	Interface between O&M Operating/Service Plan and GWY Infrastructure.....	38
2.1.2	Operating & Design Speeds.....	39
2.1.2.1	Interfaces with Guideway (excl. Trackwork).....	39
2.1.2.1.1	Interface between O&M Maximum Design Speed @ HST Tracks and GWY Infrastructure.....	39
2.1.2.1.2	Interface between O&M Maximum Design Speed @ Special Trackwork and GWY Infrastructure.....	39
2.1.3	Physical Requirements	39



2.1.3.1	Interfaces with Guideway (excl. Trackwork)	39
2.1.3.1.1	Interface between O&M Visibility of Wayside/Trackside Equipment Requirements and GWY Infrastructure.....	40
2.2	Maintenance	40
2.2.1	Interfaces with Guideway (excl. Trackwork)	40
2.2.1.1	Mol Roadway Access	40
2.2.1.1.1	Interface between O&M Mol Infrastructure Access Requirements and GWY Infrastructure.....	40
2.2.1.2	Mol Walkway & Stairs.....	41
2.2.1.2.1	Interface between O&M Mol Walkway Spatial Requirements and GWY Infrastructure.....	41
2.2.1.2.2	Interface between O&M Mol Access Stairway Spatial Requirements and GWY Infrastructure	44
2.2.1.3	Mol Live Loads	44
2.2.1.3.1	Interface between O&M Mol Walkway Floor Live Load Requirements and GWY Infrastructure	44
2.2.1.3.2	Interface between O&M Mol Access Stairway Live Load Requirements and GWY Infrastructure.....	44
2.2.1.4	Mol Equipment	44
2.2.1.4.1	Interface between O&M Mol Equipment Dynamic Envelope Requirements and GWY Infrastructure.....	45
2.2.1.4.2	Interface between O&M Mol Equipment Axle Loads Requirements and GWY Infrastructure	45
2.2.1.4.3	Interface between O&M Mol Equipment Dynamic Train-Structure Interaction Analysis and GWY Infrastructure	45
2.2.1.5	Mol Maintainability & Ease of Maintenance.....	45
2.2.1.5.1	Interface between O&M Mol CIV Maintainability & Ease of Maintenance Requirements and GWY Infrastructure.....	45
2.2.1.5.2	Interface between O&M Mol STR Maintainability & Ease of Maintenance Requirements and GWY Infrastructure.....	46
2.2.1.5.3	Interface between O&M Mol DRN Maintainability & Ease of Maintenance Requirements and GWY Infrastructure.....	46
2.3	Safety	47
2.3.1	Interfaces with Operations & Maintenance	47
2.3.1.1	PHA Mitigations.....	47
2.3.1.1.1	Interface between O&M SAF xHA Mitigations and O&M Operations & Maintenance	47
2.3.2	Interfaces with Systems	48
2.3.2.1	PHA Mitigations.....	48
2.3.2.1.1	Interface between O&M SAF xHA Mitigations and SYS Systems	48
2.3.3	Interfaces with Guideway (excl. Trackwork)	48
2.3.3.1	Emergency Egress & Access Walkway.....	48
2.3.3.1.1	Interface between O&M SAF Emergency Walkway Spatial Requirements and GWY Infrastructure	48
2.3.3.1.2	Interface between O&M SAF Emergency Walkway Floor Live Load Requirements and GWY Infrastructure	51
2.3.3.1.3	Interface between O&M SAF Emergency Walkway Handrail/Safety Barrier Requirements and GWY Infrastructure.....	51
2.3.3.2	Emergency Egress & Access Stairways	51
2.3.3.2.1	Interface between O&M SAF Egress/Access Stairway Spatial Requirements and GWY Infrastructure.....	51
2.3.3.2.2	Interface between O&M SAF Access/Egress Stairway Live Load Requirements and GWY Infrastructure	52
2.3.3.3	Emergency Egress & Access Roadways	52
2.3.3.3.1	Interface between O&M SAF Access/Egress Roadway Requirements and GWY Infrastructure	52
2.3.3.4	Containment Structures	52
2.3.3.4.1	Interface between O&M SAF Derailment Containment Structure Requirements and GWY Infrastructure	52
2.3.4	Interfaces with External.....	52



2.3.4.1	Utilities	52
2.3.4.1.1	Interface between O&M SAF Utility Access Requirements and GWY Infrastructure	52
2.4	Security	53
2.4.1	Interfaces with Operations & Maintenance	53
2.4.1.1	TVA Mitigations	53
2.4.1.1.1	Interface between O&M SEC TVA Mitigations and O&M Safety Operations	53
3	SYSTEMS.....	53
3.1	Traction Power.....	53
3.1.1	Interfaces with Operations & Maintenance	53
3.1.1.1	Maintenance.....	53
3.1.1.1.1	Interface between O&M Mol TP Facility Site Access Requirements and GWY Infrastructure.....	53
3.1.2	Interfaces with Guideway (excl. Trackwork)	54
3.1.2.1	Track Alignment	54
3.1.2.1.1	Interface between SYS TP Maximum Grade @ Phase Break Requirements and GWY Infrastructure.....	54
3.1.2.2	Traction Power Facilities & Wayside Power Cubicles (Sites)	54
3.1.2.2.1	Interface between SYS TP Facility & WPC Site Location Requirements and GWY Infrastructure	54
3.1.2.2.2	Interface between SYS TP Facility & WPC Site Spatial Requirements and GWY Infrastructure	55
3.1.2.2.3	Interface between SYS TP Facility & WPC Site Foundation Requirements and GWY Infrastructure	56
3.1.2.3	Wayside/Field Equipment	57
3.1.2.3.1	Interface between SYS TP Wayside/Field Equipment Spatial Requirements and GWY Infrastructure.....	57
3.1.2.3.2	Interface between SYS TP Wayside/Field Equipment Foundation Requirements and GWY Infrastructure	58
3.1.2.4	Conduits & Cables	59
3.1.2.4.1	Interface between SYS TP Conduit, Duct Bank, Cable Trough & Manhole Requirements and GWY Infrastructure.....	59
3.1.2.5	Dead & Live Loads	61
3.1.2.5.1	Interface between SYS TP System Dead Load Requirements and GWY Infrastructure.....	61
3.1.2.6	Utilities	61
3.1.2.6.1	Interface between SYS TP Utility Spatial Requirements and GWY Infrastructure.....	61
3.2	Overhead Contact System	61
3.2.1	Interfaces with Guideway (excl. Trackwork)	61
3.2.1.1	Pantograph Clearances	61
3.2.1.1.1	Interface between SYS OCS Pantograph Clearance Envelope Requirements and GWY Infrastructure.....	61
3.2.1.2	Wayside/Field Equipment	63
3.2.1.2.1	Interface between SYS OCS Structure & Wire Spatial Requirements and GWY Infrastructure.....	63
3.2.1.2.2	Interface between SYS OCS Wayside/Field Equipment Spatial Requirements and GWY Infrastructure	66
3.2.1.2.3	Interface between SYS OCS Phase Break Spatial Requirements and GWY Infrastructure.....	67
3.2.1.3	Foundations & Support Structures.....	68
3.2.1.3.1	Interface between SYS OCS Foundation & Supporting Structure Location Requirements and GWY Infrastructure	68
3.2.1.3.2	Interface between SYS OCS Foundation & Supporting Structure Spatial Requirements and GWY Infrastructure.....	68
3.2.1.4	Conduits & Cables	68



3.2.1.4.1	Interface between SYS OCS Conduit, Duct Bank & Manhole Requirements and GWY Infrastructure	69
3.2.1.5	Dead & Live Loads	69
3.2.1.5.1	Interface between SYS OCS Dead Load, Additional Load & Capacity Protection Requirements and GWY Infrastructure.....	69
3.2.1.6	Protective Screens	69
3.2.1.6.1	Interface between SYS OCS Protective Screening & Barrier Requirements and GWY Infrastructure	69
3.3	Automatic Train Control	70
3.3.1	Interfaces with Operations & Maintenance	70
3.3.1.1	Maintenance.....	70
3.3.1.1.1	Interface between O&M Mol ATC Interlocking & TCC House Site Access Requirements and GWY Infrastructure.....	70
3.3.2	Interfaces with Guideway (excl. Trackwork)	70
3.3.2.1	Interlockings / TCC Houses (Sites).....	70
3.3.2.1.1	Interface between SYS ATC Interlocking & TCC House Site Location Requirements and GWY Infrastructure.....	70
3.3.2.1.2	Interface between SYS ATC Interlocking & TCC House Site Spatial Requirements and GWY Infrastructure.....	71
3.3.2.1.3	Interface between SYS ATC Interlocking & TCC House Site Foundation Requirements and GWY Infrastructure	71
3.3.2.2	Wayside/Field Equipment	71
3.3.2.2.1	Interface between SYS ATC Wayside/Field Equipment Spatial Requirements and GWY Infrastructure	71
3.3.2.2.2	Interface between SYS ATC Wayside/Field Equipment Foundation Requirements and GWY Infrastructure	73
3.3.2.3	Conduits & Cables.....	73
3.3.2.3.1	Interface between SYS ATC Conduit, Duct Bank, Cable Trough & Manhole Requirements and GWY Infrastructure.....	73
3.3.2.4	Dead & Live Loads	75
3.3.2.4.1	Interface between SYS ATC System Dead Load Requirements and GWY Infrastructure.....	75
3.3.2.5	Utilities	75
3.3.2.5.1	Interface between SYS ATC System Utility Spatial Requirements and GWY Infrastructure.....	75
3.4	Communications	76
3.4.1	Interfaces with Operations & Maintenance	76
3.4.1.1	Maintenance.....	76
3.4.1.1.1	Interface between O&M Mol COM Equipment Shelter & Radio Tower Site Access Requirements and GWY Infrastructure.....	76
3.4.2	Interfaces with Guideway (excl. Trackwork)	76
3.4.2.1	Equipment Shelter (Sites)	76
3.4.2.1.1	Interface between SYS COM Equipment Shelter & Radio Tower Site Location Requirements and GWY Infrastructure.....	76
3.4.2.1.2	Interface between SYS COM Equipment Shelter & Radio Tower Site Spatial Requirements and GWY Infrastructure.....	77
3.4.2.1.3	Interface between SYS COM Equipment Shelter & Radio Tower Site Foundation Requirements and GWY Infrastructure	78
3.4.2.2	Wayside/Field Equipment	78
3.4.2.2.1	Interface between SYS COM Wayside/Field Equipment Spatial Requirements and GWY Infrastructure.....	78
3.4.2.2.2	Interface between SYS COM Wayside/Field Equipment Foundation Requirements and GWY Infrastructure	79
3.4.2.3	Conduits & Cables.....	80
3.4.2.3.1	Interface between SYS COM Conduit, Duct Bank, Cable Trough & Manhole Requirements and GWY Infrastructure.....	80
3.4.2.4	Air Gaps.....	82
3.4.2.4.1	Interface between SYS COM Air Gap Requirements and GWY Infrastructure.....	82



3.4.2.5	Dead & Live Loads	82
3.4.2.5.1	Interface between SYS COM System Dead Load Requirements and GWY Infrastructure	82
3.5	Grounding & Bonding	83
3.5.1	Interfaces with Guideway (excl. Trackwork)	83
3.5.1.1	Systemwide.....	83
3.5.1.1.1	Interface between SYS Conduit, Duct Bank, Cable Trough & Manhole Requirements G&B Requirements and GWY Infrastructure	83
3.5.1.2	At-Grade	83
3.5.1.2.1	Interface between SYS At-Grade G&B Requirements and GWY Infrastructure.....	83
3.5.1.3	Aerial Structures	83
3.5.1.3.1	Interface between SYS Aerial Structure G&B Requirements and GWY Infrastructure.....	83
3.5.1.3.2	Interface between SYS New Overpass Structure G&B Requirements and GWY Infrastructure.....	84
3.5.1.4	Trench Structures	84
3.5.1.4.1	Interface between SYS Trench Structure G&B Requirements and GWY Infrastructure	84
3.5.1.4.2	Interface between SYS Cut & Cover Tunnel Structure G&B Requirements and GWY Infrastructure.....	84
3.5.1.5	Utilities	84
3.5.1.5.1	Interface between SYS Utility G&B Requirements and GWY Infrastructure.....	84
3.5.1.6	External.....	85
3.5.1.6.1	Interface between SYS Existing Overpass Structure G&B Requirements and GWY Infrastructure	85
4	ROLLING STOCK	85
4.1	HST Trainsets.....	85
4.1.1	Interfaces with Guideway (excl. Trackwork)	85
4.1.1.1	Track Alignment	85
4.1.1.1.1	Interface between RST HST Trainset Minimum Radii Requirements and GWY Infrastructure	85
4.1.1.1.2	Interface between RST HST Trainset Actual Superelevation Requirements (incl. Tilting) and GWY Infrastructure	86
4.1.1.1.3	Interface between RST HST Trainset Unbalanced Superelevation Requirements and GWY Infrastructure	86
4.1.1.1.4	Interface between RST HST Trainset Maximum Grade Requirements and GWY Infrastructure.....	86
4.1.1.2	Vehicle Static Gauge & Dynamic Envelope.....	86
4.1.1.2.1	Interface between RST HST Trainset Static Gauge Requirements and GWY Infrastructure	86
4.1.1.2.2	Interface between RST HST Trainset Dynamic Envelope Requirements and GWY Infrastructure	87
4.1.1.3	Aerodynamic Effects.....	87
4.1.1.3.1	Interface between RST HST Trainset Aerodynamic Effects and GWY Infrastructure	87
4.1.1.4	Loads & Forces	88
4.1.1.4.1	Interface between RST HST Trainset Axle Loads and GWY Infrastructure	88
4.1.1.4.2	Interface between RST HST Trainset Dynamic Train-Structure Interaction Analysis and GWY Infrastructure.....	88
4.1.1.4.3	Interface between RST HST Trainset Traction & Braking Forces and GWY Infrastructure.....	89
4.1.1.4.4	Interface between RST HST Trainset Nosing & Hunting Effects and GWY Infrastructure.....	89
4.1.1.4.5	Interface between RST HST Trainset Derailment/Collision Loads and GWY Infrastructure.....	89
5	GUIDEWAY (EXCL. TRACKWORK).....	89



5.1	Drainage	90
5.1.1	Interfaces with Operations & Maintenance	90
5.1.1.1	Maintenance.....	90
5.1.1.1.1	Interface between O&M Mol Pump Station Site Access Requirements and GWY Infrastructure.....	90
6	EXTERNAL	90
6.1	Shared Rail Corridor	90
6.1.1	Interfaces with Guideway (excl. Trackwork)	91
6.1.1.1	Intrusion Protection.....	91
6.1.1.1.1	Interface between GWY Railroad Intrusion Protection Requirements and GWY Infrastructure	91
6.2	Shared Use Track.....	91
6.2.1	Interfaces with Guideway (excl. Trackwork)	91
6.2.1.1	Vehicle Static Gauge & Dynamic Envelope.....	91
6.2.1.1.1	Interface between EXT Shared Use Track Trainset Dynamic Envelope Requirements and GWY Infrastructure.....	91
6.2.1.2	Loads & Forces	91
6.2.1.2.1	Interface between EXT Shared Use Track Axle Loads and GWY Infrastructure	91
6.2.1.2.2	Interface between EXT Shared Use Track Trainset Dynamic Train-Structure Interaction Analysis and GWY Infrastructure	92
6.2.1.2.3	Interface between EXT Shared Use Track Trainset Derailment/Collision Loads and GWY Infrastructure	92
6.3	Amtrak.....	92
6.3.1	Interfaces with Guideway (excl. Trackwork)	92
6.3.1.1	Vehicle Static Gauge & Dynamic Envelope.....	92
6.3.1.1.1	Interface between EXT Amtrak Trainset Dynamic Envelope Requirements and GWY Infrastructure.....	92
6.3.1.2	Loads & Forces	92
6.3.1.2.1	Interface between EXT Amtrak Trainset Axle Loads and GWY Infrastructure	92
6.3.1.2.2	Interface between EXT Amtrak Trainset Dynamic Train-Structure Interaction Analysis and GWY Infrastructure	93
6.3.1.2.3	Interface between EXT Amtrak Trainset Derailment/Collision Loads and GWY Infrastructure	93
6.4	High/Roadways.....	93
6.4.1	Interfaces with Guideway (excl. Trackwork)	93
6.4.1.1	Intrusion Protection.....	93
6.4.1.1.1	Interface between GWY Roadway Intrusion Protection Spatial Needs and GWY Infrastructure.....	93
6.5	Pedestrians & Wildlife	94
6.5.1	Interfaces with Guideway (excl. Trackwork)	94
6.5.1.1	Access Control	94
6.5.1.1.1	Interface between GWY Pedestrian/Wildlife Access Control Requirements and GWY Infrastructure.....	94
6.6	Construction Equipment.....	94
6.6.1	Interfaces with Guideway (excl. Trackwork)	94
6.6.1.1	Loads & Forces	94
6.6.1.1.1	Interface between EXT Construction Equipment Axle Loads and GWY Infrastructure	94
6.6.1.1.2	Interface between EXT Construction Equipment Dynamic Train-Structure Interaction Analysis and GWY Infrastructure.....	95



See end of table for legend

ID	Interface	Document Reference(s)
	1 General	
	1.1 Environmental	
	1.1.1 Hazardous Conditions	
	1.1.1.1 Interfaces with Guideway (excl. Trackwork)	
IF 1201	1.1.1.1.1 Interface between GEN Seismic Event and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the GEN seismic event impacts have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • No Collapse Performance Level (NCL) • Operability Performance Level (OPL) • ... 	<ul style="list-style-type: none"> • DCM, 11.4.1.1, General Classifications • DCM, 11.5.1, Seismic Performance Criteria • DCM, 11.5.2, Design Earthquakes • DCM, 12.4.2, Seismic Design • DCM, 12.5.2.10, Seismic Loads (MCE, OBE) • DCM, 13.8.4, Seismic Load Considerations • DCM, 13.9.4, Seismic Analysis
	1.1.2 Fault Zones	
	1.1.2.1 Interfaces with Guideway (excl. Trackwork)	
IF 263	1.1.2.1.1 Interface between GEN Fault Zones and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the GEN fault zones have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • Alignment crossing the fault zones perpendicular • Alignment crossing the fault zones at-grade without structures • ... 	<ul style="list-style-type: none"> • DCM, 11.5.3, Hazardous Fault Crossings • DCM, 11.10, Fault Displacement Analysis and Mitigation Guidelines • DCM, 10.8.5.4, Embankments over Active Fault Locations • DCM, 10.13, Structures over/near Active Faults and Mitigation • DCM, 12.4.2, Seismic Design • DCM, 13.14.8, Fault Zones • DCM, 3.6.3, Additional Clearance for Seismic Fault Zones
	1.2 Reliability, Availability, Maintainability & Safety	
	1.2.1 Reliability & Availability	
	1.2.1.1 Interfaces with Guideway (excl. Trackwork)	



ID	Interface	Document Reference(s)
IF 1233	1.2.1.1.1 Interface between GEN Reliability & Availability Targets and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the applicable GEN RAMS targets have been addressed by the INF team, including but not limited to:</p> <ul style="list-style-type: none"> • Reliability • Availability • ... 	<ul style="list-style-type: none"> • DCM, 1.4.6, Design Life • DCM, 1.5, Durability • DCM, 10.8.6, Soil Materials Used for Embankments • DCM, 12.4.1, Structural Design Parameters • DCM, 12.8.6.8, Expansion Joints • DCM, 12.8.6.9, Bearings • DCM, 12.11.3.5, Water tightness • DCM, 13.6.3, Durability • DCM, 8.1, Scope • DCM, 8.5.3.1, Design Elements • DCM, 9.5.3, Encroachment Justifications • General Provisions, 57, Reliability, Availability, Maintainability and Safety (RAMS) Requirements • Scope of Work, 5.10.1, Reliability of the Drainage Subsystem • Special Provisions, 16.1, General • Special Provisions, 16.2, Reliability • Special Provisions, 16.3, Availability
	2 Operations & Maintenance	
	2.1 Operations	
	2.1.1 Train Operating/Service Plan	
	2.1.1.1 Interfaces with Guideway (excl. Trackwork)	
IF 230	2.1.1.1.1 Interface between O&M Operating/Service Plan and GWY Infrastructure	



ID	Interface	Document Reference(s)
	Purpose/Scope: Ensures that the O&M operating/service plan requirements have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • Track capacity • Crossover spacing between stations • Crossover spacing in proximity to stations • Track alignment at stations (station siding tracks) • ... 	<ul style="list-style-type: none"> • ConOps, 5.1, Operational Scope of the High-Speed System • ConOps, 5.4, Planned Capabilities • ConOps, 8.14.1, CHST Mainline Corridor • ConOps, 6.3.1.1, Turnouts and Crossovers • ConOps, 8.4.1, Full Build Timetable Schedule • DCM, 1.2.6, Trip Travel Times • DCM, 4.4, Horizontal Alignment • DCM, 4.10, High-Speed Crossovers • DCM, 4.13, Track Layout along Station Platforms
	2.1.2 Operating & Design Speeds	
	2.1.2.1 Interfaces with Guideway (excl. Trackwork)	
IF 355	2.1.2.1.1 Interface between O&M Maximum Design Speed @ HST Tracks and GWY Infrastructure	
	Purpose/Scope: Ensures that the O&M maximum design speed at HST tracks has been applied by the INF team.	<ul style="list-style-type: none"> • ConOps, 4.3, The High-Speed Train System Strategy • DCM, 1.2.5, Design and Operating Speeds • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.5, Track Center Spacing • DCM, 3.5, Track Center Spacing • DCM, 4.4.2, Minimum Lengths of Alignment Segments • DCM, 4.4.3, Minimum Radii • DCM, 4.4.5.2, Actual Superelevation • DCM, 4.4.5.3, Unbalanced Superelevation • DCM, 4.4.6.3, Spiral Lengths • DCM, 4.5.2.2, Vertical Curve Lengths (LVC)
IF 4355	2.1.2.1.2 Interface between O&M Maximum Design Speed @ Special Trackwork and GWY Infrastructure	
	Purpose/Scope: Ensures that the O&M maximum design speed at special trackwork has been applied by the INF team.	<ul style="list-style-type: none"> • DCM, 4.10, High-Speed Crossovers • DCM, 4.7, High-Speed Turnouts (60 mph and faster)
	2.1.3 Physical Requirements	
	2.1.3.1 Interfaces with Guideway (excl. Trackwork)	



ID	Interface	Document Reference(s)
IF 597	2.1.3.1.1 Interface between O&M Visibility of Wayside/Trackside Equipment Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M visibility of wayside/trackside equipment requirements have been applied by the INF team.	<ul style="list-style-type: none"> • ConOps, 6.3.1, Track • DCM, 3.4, Vehicle Clearance Envelopes
	2.2 Maintenance	
	2.2.1 Interfaces with Guideway (excl. Trackwork)	
	2.2.1.1 Mol Roadway Access	
IF 911	2.2.1.1.1 Interface between O&M Mol Infrastructure Access Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the O&M Mol infrastructure access requirements have been addressed by the INF team.</p>	<ul style="list-style-type: none"> • DCM, 12.4.1, Structural Design Parameters • DCM, 12.8, Design Considerations for Aerial Trackways and Structures • DCM, 13.15.6, Fencing • DCM, 13.16.21, Parking for Tunnel Maintenance and Traction Power Facility • DCM, 13.16.4.2, Fixed Facility Power • DCM, 13.16.5, Access Road • DCM, 7.7.1.1, Access Roads • DCM, 7.8.1.5, Gates • Drawing DD-CV-006, FENCE AND GATE DETAILS • Drawing DD-CV-007, FENCE AND GATES LOCATIONS • Drawing DD-TN-400, TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE TWIN TUNNEL CONFIGURATION, PLAN • Drawing DD-TN-401, TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE TWIN TUNNEL CONFIGURATION, ELEVATION • Drawing DD-TN-403, TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE SINGLE TUNNEL CONFIGURATION, PLAN • Drawing DD-TN-404, TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE SINGLE TUNNEL CONFIGURATION, ELEVATION • Drawing DD-TN-406, BELOW GRADE PORTAL ARRANGEMENT SHOWING MAXIMUM FACILITIES FOR SINGLE TRACK TWIN BORED TUNNEL -PLAN • Drawing DD-TN-407, BELOW GRADE PORTAL ARRANGEMENT SHOWING MAXIMUM FACILITIES FOR SINGLE TRACK TWIN BORED TUNNEL -PROFILE • Maintenance of Infrastructure, 2, CHST Infrastructure System And Maintainability • Maintenance of Infrastructure, 2.5, Structures • Maintenance of Infrastructure, 9.3.1, Tunnels • Maintenance of Infrastructure, 9.3.2, Bridges and Aerial Structures • Maintenance of Infrastructure, 9.3.3, Depressed Structures • Maintenance of Infrastructure, 9.4, Right of Way Access
	2.2.1.2 Mol Walkway & Stairs	
IF 843	2.2.1.2.1 Interface between O&M Mol Walkway Spatial Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the O&M Mol walkway spatial requirements have been addressed by the INF team.</p>	<ul style="list-style-type: none"> • DCM, 12.14.1, Cable Trough • DCM, 12.8.6.15, Walkways, Parapets, and Sound Walls • DCM, 13.15.5, Design Requirements for Cable Troughs • DCM, 13.3.6, Walkways • DCM, 3.2, Regulations, Codes, Standards, and Guidelines • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.4.4, Effects of Superelevation • DCM, 3.5, Track Center Spacing • DCM, 3.7.1, Appendix 3.A Structure Gauge, Tangent Track • DCM, 3.7.2, Appendix 3.B Structure Gauge, Superelevated Track • DCM, 3.7.5, Appendix 3.E Fixed Equipment Envelope, Tangent Track • DCM, 3.7.6, Appendix 3.F Fixed Equipment Envelope, Superelevated Track • DCM, 7.7.7, Walkways and Cable Trough • Drawing DD-CV-001, TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, EMBANKMENT • Drawing DD-CV-002, TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, OPEN CUT • Drawing DD-CV-003, TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, RETAINED FILL • Drawing DD-CV-004, TYPICAL CROSS SECTION, ONE TRACK NON-BALLASTED, EMBANKMENT AND OPEN CUT • Drawing DD-CV-005, TYPICAL CROSS SECTION, FOUR TRACK NON-BALLASTED, EMBANKMENT • Drawing DD-ST-001, AERIAL STRUCTURE, TWO TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK • Drawing DD-ST-002, AERIAL STRUCTURE, ONE TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK • Drawing DD-ST-003, AERIAL STRUCTURE, TYPICAL CABLE TROUGH DETAILS • Drawing DD-ST-004, AERIAL STRUCTURE, CABLE TROUGH DETAILS, AT OCS POLE • Drawing DD-ST-010, TYPICAL CROSS SECTION, FOR TWO TRACK TRENCH, OUTSIDE WALKWAY • Drawing DD-ST-011, CABLE TROUGH DETAILS, TRENCH / CUT AND COVER TUNNEL • Drawing DD-ST-012, CABLE TROUGH LAYOUT TRANSITION AREAS • Drawing DD-ST-012, CABLE TROUGH LAYOUT TRANSITION AREAS • Drawing DD-ST-013, TYPICAL CABLE TROUGH DETAILS, EMBANKMENT/CUT • Drawing DD-ST-017, AERIAL STRUCTURE, FOUR TRACK NON-BALLASTED, CROSS SECTIONS FOR BOX GIRDER • Drawing DD-ST-018, TYPICAL CROSS SECTION, TRENCH FOR TWO TRACK, INSIDE WALKWAY



ID	Interface	Document Reference(s)
	(continued)	<ul style="list-style-type: none"> • Drawing DD-ST-019, TYPICAL CROSS SECTION, TRENCH FOR ONE TRACK • Drawing DD-TN-102, TYPICAL CROSS SECTION MINED TUNNEL DOUBLE TRACK • Drawing DD-TN-103, TYPICAL CROSS SECTION-TWIN TRACK SINGLE BORED (TBM/ CIRCULAR) TUNNEL WITH SEPARATION WALL • Drawing DD-TN-104, TYPICAL CROSS SECTION-TWIN TRACK SINGLE MINED TUNNEL WITHOUT SEPARATION WALL • Drawing DD-TN-105, TYPICAL CROSS SECTION-TWIN TRACK SINGLE BORED (TBM/ CIRCULAR) TUNNEL WITHOUT SEPARATION WALL • Drawing DD-TN-111, TYPICAL ATC EQUIPMENT • Drawing DD-TN-112, TYPICAL FIXED MOTORIZED DISCONNECT • Drawing DD-TN-113, ATC SIGNALING AND COMMUNICATION SYSTEMS • Drawing DD-TN-200, BASIC TUNNEL CONFIGURATION SINGLE TRACK TWIN TBM BORED TUNNEL DOUBLE TRAIN (1312 FT) • Drawing DD-TN-201, BASIC TUNNEL CONFIGURATION SINGLE TRACK TWIN TBM BORED TUNNEL SINGLE TRAIN (660 FT) • Drawing DD-TN-203, BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE MINED TUNNEL WITH SEPARATION WALL SINGLE TRAIN (660 FT) • Drawing DD-TN-204, BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE MINED TUNNEL WITHOUT SEPARATION WALL, DOUBLE TRAIN (1312 FT) • Drawing DD-TN-205, BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE MINED TUNNEL WITHOUT SEPARATION WALL SINGLE TRAIN (660 FT) • Drawing DD-TN-206, BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE BORED TUNNEL WITHOUT SEPARATION WALL DOUBLE TRAIN (1312 FT) • Drawing DD-TN-207, BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE BORED TUNNEL WITHOUT SEPARATION WALL SINGLE TRAIN (660 FT) • Drawing DD-TN-300, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT SINGLE TRACK TWIN TBM BORED TUNNEL • Drawing DD-TN-301, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT TWIN TRACK SINGLE MINED TUNNEL • Drawing DD-TN-302, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT TYPICAL CROSS SECTION-TWIN TRACK SINGLE MINED TUNNEL WITHOUT SEPARATION WALL • Drawing DD-TN-303, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT-TWIN TRACK SINGLE BORED (TBM/ CIRCULAR) TUNNEL WITHOUT SEPARATION WALL • Maintenance of Infrastructure, 1.2.6, CHST and PUC Standards • Maintenance of Infrastructure, 7.6.1, California Public Utilities Commission (CPUC)



ID	Interface	Document Reference(s)
IF 912	2.2.1.2.2 Interface between O&M Mol Access Stairway Spatial Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M Mol access stairway spatial requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • ConOps, 6.3.5.2, Aerial Right-of-Way • DCM, 12.10.8, Trench Emergency Exits • DCM, 12.14.7, Access Stairs • DCM, 12.8.8, Emergency Access • DCM, 7.7.11, Emergency Stairs • DCM, 7.8.1.5, Gates • DCM, 7.8.2.6, Trackway on Aerial Structure • DCM, 7.8.2.7, Trackway on Retained Fill • Drawing DD-CV-007, FENCE AND GATES LOCATIONS • Drawing DD-ST-008, AERIAL STRUCTURE, EMERGENCY EXIT STAIRWAY DETAILS 1 • Drawing DD-ST-009, AERIAL STRUCTURE, EMERGENCY EXIT STAIRWAY DETAILS 2 • Maintenance of Infrastructure, 9.3.2, Bridges and Aerial Structures • Maintenance of Infrastructure, 9.3.3, Depressed Structures • Maintenance of Infrastructure, 9.4, Right of Way Access
	2.2.1.3 Mol Live Loads	
IF 3481	2.2.1.3.1 Interface between O&M Mol Walkway Floor Live Load Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M Mol walkway live load requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • Maintenance of Infrastructure, 5, Maintenance Of Infrastructure Equipment And Vehicles • DCM, 7.7.7, Walkways and Cable Trough • DCM, 12.5.2.1, Live Loads (LLP, LLV, LLRR, LLH, LLS) • DCM, 12.7.1.4, Floor Load • DCM, 12.8.6.15, Walkways, Parapets, and Sound Walls
IF 3839	2.2.1.3.2 Interface between O&M Mol Access Stairway Live Load Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M Mol access stairway live load requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • Maintenance of Infrastructure, 5, Maintenance Of Infrastructure Equipment And Vehicles • DCM, 12.5.2.1, Live Loads (LLP, LLV, LLRR, LLH, LLS) • DCM, 12.7.1.4, Floor Load
	2.2.1.4 Mol Equipment	



ID	Interface	Document Reference(s)
IF 512	2.2.1.4.1 Interface between O&M Mol Equipment Dynamic Envelope Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M Mol equipment dynamic envelope requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • Maintenance of Infrastructure, 1.2.6, CHST and PUC Standards • Maintenance of Infrastructure, 5, Maintenance Of Infrastructure Equipment And Vehicles • Maintenance of Infrastructure, 5.1, Typical MOI Equipment • DCM, 3.1, Scope • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.3, Appendix 3.C Composite Static Envelope and Dynamic Envelope, Tangent Track • DCM, 3.7.4, Appendix 3.D Composite Static Envelope and Dynamic Envelope, Superelevated Track
IF 3691	2.2.1.4.2 Interface between O&M Mol Equipment Axle Loads Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M Mol equipment axle loads have been addressed by the INF team.	<ul style="list-style-type: none"> • Maintenance of Infrastructure, 5, Maintenance Of Infrastructure Equipment And Vehicles • Maintenance of Infrastructure, 5.1, Typical MOI Equipment • DCM, 12.5.2.1, Live Loads (LLP, LLV, LLRR, LLH, LLS) • DCM, 13.9.5, Fatigue Analysis • DCM, 9.5.4.5, Placement
IF 3678	2.2.1.4.3 Interface between O&M Mol Equipment Dynamic Train-Structure Interaction Analysis and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M Mol equipment dynamic train-structure interaction has been addressed by the INF team.	<ul style="list-style-type: none"> • Maintenance of Infrastructure, 5.1, Typical MOI Equipment • DCM, 12.5.2.2, Vertical Impact Effect (I) • DCM, 12.6, Track-Structure Interaction • DCM, 13.9.3, Dynamic Analysis
	2.2.1.5 Mol Maintainability & Ease of Maintenance	
IF 2586	2.2.1.5.1 Interface between O&M Mol CIV Maintainability & Ease of Maintenance Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<u>Purpose/Scope:</u> Ensures that the applicable O&M MoI CIV maintainability & ease of maintenance requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 1.4, General Design Parameters • DCM, 1.5, Durability • DCM, 7.3, Grading, Side Slopes, and Retaining Walls for Roadway and Site Embankments • DCM, 7.5, Slope/Surface Protection Systems Best Management Practices • DCM, 7.7.4, Signage • DCM, 3.5, Track Center Spacing
IF 5892	2.2.1.5.2 Interface between O&M MoI STR Maintainability & Ease of Maintenance Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the applicable O&M MoI STR maintainability & ease of maintenance requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • Maintenance of Infrastructure, 2.5, Structures • Maintenance of Infrastructure, 9.3, Structures • Maintenance of Infrastructure, 9.3.2, Bridges and Aerial Structures • Maintenance of Infrastructure, 9.3.3, Depressed Structures • Maintenance of Infrastructure, 10.3.9, Replacement of Bridge Structure/Components • DCM, 1.4, General Design Parameters • DCM, 1.5, Durability • DCM, 12.4.1, Structural Design Parameters • DCM, 12.6.4, Track Serviceability Analysis • DCM, 12.6.4.2, Vertical Deflection Limits: Group 1a • DCM, 12.6.4.5, Transverse Deflection Limits • DCM, 12.9.2, Requirements for Highway Bridges • DCM, 12.8, Design Considerations for Aerial Trackways and Structures • DCM, 12.8.4.6, Inspection and Maintenance • DCM, 12.8.5.4, Maintenance and Inspection of Concrete Structures • DCM, 12.8.6.8, Expansion Joints • DCM, 12.11.3.5, Water tightness • DCM, 12.8.10, Maintenance of HST Structures • DCM, 12.6.4.3, Vertical Deflection Limits: Group 1b • DCM, 3.5, Track Center Spacing
IF 1203	2.2.1.5.3 Interface between O&M MoI DRN Maintainability & Ease of Maintenance Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the O&M MoI STR maintainability & ease of maintenance requirements have been addressed by the INF team.</p>	<ul style="list-style-type: none"> • Maintenance of Infrastructure, 2.5, Structures • Maintenance of Infrastructure, 9.2.2, Drainage • Maintenance of Infrastructure, 9.3.1, Tunnels • Maintenance of Infrastructure, 9.3.2, Bridges and Aerial Structures • Maintenance of Infrastructure, 9.3.3, Depressed Structures • DCM, 8.5.2.1, Open Channel Hydraulics • DCM, 8.5.2.1.6, Channel Lining • DCM, 8.6.1, Track Drainage Systems • DCM, 8.6.3.4, Deck Drainage System • DCM, 8.6.3.4.3, Pipes and Downspouts • DCM, 8.6.9.2, Storm Drain Design • DCM, 8.6.9.3, Inlets and Maintenance Access • DCM, 8.6.9.4, Pipe Characteristics • DCM, 8.5.2.3, Underdrain System • DCM, 8.5.2.3.4, Access Holes/Cleanouts and Risers • DCM, 8.5.2.5, Siphons • DCM, 8.5.2.5.4, Collars and Blowoff Structures • DCM, 8.5.2.6, Pump Stations • Drawing SD-CD-001, TRACK DRAIN / UNDERDRAIN, CLEANOUT & RISER DETAILS • Drawing SD-CD-003, STORM DRAIN MAN HOLES
	2.3 Safety	
	2.3.1 Interfaces with Operations & Maintenance	
	2.3.1.1 PHA Mitigations	
IF 3889	2.3.1.1.1 Interface between O&M SAF xHA Mitigations and O&M Operations & Maintenance	



ID	Interface	Document Reference(s)
	<u>Purpose/Scope:</u> Ensures that the applicable O&M safety hazard analysis mitigations have been addressed by the O&M team, including but not limited to: <ul style="list-style-type: none"> • Preliminary hazard analysis • Collision hazard analysis • Seismic hazard analysis • Interface hazard analysis • Operations & Support Hazard Analysis • System Hazard Analysis • Subsystem Hazard Analysis • ... 	<ul style="list-style-type: none"> • Maintenance of Infrastructure, 1.3, Environmental Concerns
	2.3.2 Interfaces with Systems	
	2.3.2.1 PHA Mitigations	
IF 4029	2.3.2.1.1 Interface between O&M SAF xHA Mitigations and SYS Systems	
	<u>Purpose/Scope:</u> Ensures that the applicable O&M safety hazard analysis mitigations have been addressed by the SYS team, including but not limited to: <ul style="list-style-type: none"> • Preliminary hazard analysis • Collision hazard analysis • Seismic hazard analysis • Interface hazard analysis • Operations & Support Hazard Analysis • System Hazard Analysis • Subsystem Hazard Analysis • ... 	<ul style="list-style-type: none"> • DCM, 22.4, Maximum Permissible Step and Touch Potential
	2.3.3 Interfaces with Guideway (excl. Trackwork)	
	2.3.3.1 Emergency Egress & Access Walkway	
IF 3872	2.3.3.1.1 Interface between O&M SAF Emergency Walkway Spatial Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the O&M safety emergency walkway spatial requirements have been addressed by the INF team.</p>	<ul style="list-style-type: none"> • DCM, 7.7.7, Walkways and Cable Trough • DCM, 12.8.6.15, Walkways, Parapets, and Sound Walls • DCM, 12.14.1, Cable Trough • DCM, 13.3.6, Walkways • DCM, 13.15.5, Design Requirements for Cable Troughs • DCM, 13.16.11, Paved Emergency Egress from Tunnels • DCM, 3.2, Regulations, Codes, Standards, and Guidelines • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.4.4, Effects of Superelevation • DCM, 3.5, Track Center Spacing • DCM, 3.7.1, Appendix 3.A Structure Gauge, Tangent Track • DCM, 3.7.2, Appendix 3.B Structure Gauge, Superelevated Track • DCM, 3.7.5, Appendix 3.E Fixed Equipment Envelope, Tangent Track • DCM, 3.7.6, Appendix 3.F Fixed Equipment Envelope, Superelevated Track • Drawing DD-CV-001, TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, EMBANKMENT • Drawing DD-CV-002, TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, OPEN CUT • Drawing DD-CV-003, TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, RETAINED FILL • Drawing DD-CV-004, TYPICAL CROSS SECTION, ONE TRACK NON-BALLASTED, EMBANKMENT AND OPEN CUT • Drawing DD-CV-005, TYPICAL CROSS SECTION, FOUR TRACK NON-BALLASTED, EMBANKMENT • Drawing DD-ST-012, CABLE TROUGH LAYOUT TRANSITION AREAS • Drawing DD-ST-013, TYPICAL CABLE TROUGH DETAILS, EMBANKMENT/CUT • Drawing DD-ST-001, AERIAL STRUCTURE, TWO TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK • Drawing DD-ST-002, AERIAL STRUCTURE, ONE TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK • Drawing DD-ST-003, AERIAL STRUCTURE, TYPICAL CABLE TROUGH DETAILS • Drawing DD-ST-004, AERIAL STRUCTURE, CABLE TROUGH DETAILS, AT OCS POLE • Drawing DD-ST-012, CABLE TROUGH LAYOUT TRANSITION AREAS • Drawing DD-ST-017, AERIAL STRUCTURE, FOUR TRACK NON-BALLASTED, CROSS SECTIONS FOR BOX GIRDER • Drawing DD-ST-010, TYPICAL CROSS SECTION, FOR TWO TRACK TRENCH, OUTSIDE WALKWAY



ID	Interface	Document Reference(s)
	(continued)	<ul style="list-style-type: none"> • Drawing DD-ST-011, CABLE TROUGH DETAILS, TRENCH / CUT AND COVER TUNNEL • Drawing DD-ST-012, CABLE TROUGH LAYOUT TRANSITION AREAS • Drawing DD-ST-018, TYPICAL CROSS SECTION, TRENCH FOR TWO TRACK, INSIDE WALKWAY • Drawing DD-ST-019, TYPICAL CROSS SECTION, TRENCH FOR ONE TRACK • Drawing DD-TN-103, TYPICAL CROSS SECTION-TWIN TRACK SINGLE BORED (TBM/ CIRCULAR) TUNNEL WITH SEPARATION WALL • Drawing DD-TN-105, TYPICAL CROSS SECTION-TWIN TRACK SINGLE BORED (TBM/ CIRCULAR) TUNNEL WITHOUT SEPARATION WALL • Drawing DD-TN-200, BASIC TUNNEL CONFIGURATION SINGLE TRACK TWIN TBM BORED TUNNEL DOUBLE TRAIN (1312 FT) • Drawing DD-TN-201, BASIC TUNNEL CONFIGURATION SINGLE TRACK TWIN TBM BORED TUNNEL SINGLE TRAIN (660 FT) • Drawing DD-TN-206, BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE BORED TUNNEL WITHOUT SEPARATION WALL DOUBLE TRAIN (1312 FT) • Drawing DD-TN-207, BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE BORED TUNNEL WITHOUT SEPARATION WALL SINGLE TRAIN (660 FT) • Drawing DD-TN-300, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT SINGLE TRACK TWIN TBM BORED TUNNEL • Drawing DD-TN-303, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT-TWIN TRACK SINGLE BORED (TBM/ CIRCULAR) TUNNEL WITHOUT SEPARATION WALL • Drawing DD-TN-102, TYPICAL CROSS SECTION MINED TUNNEL DOUBLE TRACK • Drawing DD-TN-104, TYPICAL CROSS SECTION-TWIN TRACK SINGLE MINED TUNNEL WITHOUT SEPARATION WALL • Drawing DD-TN-110, TYPICAL SUMP ENLARGEMENT IN RUNNING TUNNEL SINGLE TRACK TWIN BORED TUNNEL • Drawing DD-TN-112, TYPICAL FIXED MOTORIZED DISCONNECT • Drawing DD-TN-113, ATC SIGNALING AND COMMUNICATION SYSTEMS • Drawing DD-TN-203, BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE MINED TUNNEL WITH SEPARATION WALL SINGLE TRAIN (660 FT) • Drawing DD-TN-204, BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE MINED TUNNEL WITHOUT SEPARATION WALL, DOUBLE TRAIN (1312 FT) • Drawing DD-TN-205, BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE MINED TUNNEL WITHOUT SEPARATION WALL SINGLE TRAIN (660 FT)



ID	Interface	Document Reference(s)
	(continued)	<ul style="list-style-type: none"> • Drawing DD-TN-301, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT TWIN TRACK SINGLE MINED TUNNEL • Drawing DD-TN-302, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT TYPICAL CROSS SECTION-TWIN TRACK SINGLE MINED TUNNEL WITHOUT SEPARATION WALL
IF 3470	2.3.3.1.2 Interface between O&M SAF Emergency Walkway Floor Live Load Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M safety emergency walkway live load requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.5.2.1, Live Loads (LLP, LLV, LLRR, LLH, LLS) • DCM, 12.7.1.4, Floor Load • DCM, 12.8.6.15, Walkways, Parapets, and Sound Walls
IF 3927	2.3.3.1.3 Interface between O&M SAF Emergency Walkway Handrail/Safety Barrier Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M safety emergency walkway handrail/safety barrier requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • Maintenance of Infrastructure, 7.6.1, California Public Utilities Commission (CPUC) • DCM, 12.10, Earth Retaining Structures • DCM, 12.8.6.15, Walkways, Parapets, and Sound Walls • Drawing DD-TT-001, TYPICAL TWO TRACK - NON-BALLASTED, PRECAST CONCRETE SLAB TRACK, INDEPENDENT DUAL BLOCK TRACK • Drawing DD-TT-002, TYPICAL TWO TRACK - BALLASTED
	2.3.3.2 Emergency Egress & Access Stairways	
IF 3932	2.3.3.2.1 Interface between O&M SAF Egress/Access Stairway Spatial Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M safety egress/access stairway spatial requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 7.8.1.5, Gates • Drawing DD-CV-007, FENCE AND GATES LOCATIONS • Drawing DD-CV-006, FENCE AND GATE DETAILS • DCM, 12.10.8, Trench Emergency Exits • DCM, 12.14.7, Access Stairs • Drawing DD-ST-008, AERIAL STRUCTURE, EMERGENCY EXIT STAIRWAY DETAILS 1 • Drawing DD-ST-009, AERIAL STRUCTURE, EMERGENCY EXIT STAIRWAY DETAILS 2



ID	Interface	Document Reference(s)
IF 3799	2.3.3.2.2 Interface between O&M SAF Access/Egress Stairway Live Load Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M safety egress/access stairway live load requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.5.2.1, Live Loads (LLP, LLV, LLRR, LLH, LLS) • DCM, 12.7.1.4, Floor Load
	2.3.3.3 Emergency Egress & Access Roadways	
IF 3937	2.3.3.3.1 Interface between O&M SAF Access/Egress Roadway Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M safety egress/access roadway requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 7.8.1.5, Gates • DCM, 7.7.1.1, Access Roads • Drawing DD-CV-006, FENCE AND GATE DETAILS • Drawing DD-CV-007, FENCE AND GATES LOCATIONS • Drawing DD-SY-010, TYPICAL CIVIL ACCOMMODATIONS, SYSTEM SITES • Drawing DD-SY-010, TYPICAL CIVIL ACCOMMODATIONS, SYSTEM SITES
	2.3.3.4 Containment Structures	
IF 3355	2.3.3.4.1 Interface between O&M SAF Derailment Containment Structure Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M safety derailment containment structure (protection wall) requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.5.2.13, Derailment Loads (DR) • DCM, 3.4, Vehicle Clearance Envelopes • Drawing DD-ST-001, AERIAL STRUCTURE, TWO TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK • Drawing DD-ST-002, AERIAL STRUCTURE, ONE TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK
	2.3.4 Interfaces with External	
	2.3.4.1 Utilities	
IF 2737	2.3.4.1.1 Interface between O&M SAF Utility Access Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<u>Purpose/Scope:</u> Ensures that the O&M SAF utility access requirements have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • Traction power utilities • Facility power utilities • Gas/fuel lines utilities • Water utilities • Sewer utilities • Communications/telephone utilities • ... 	<ul style="list-style-type: none"> • DCM, 7.7, Site Work – Authority Facilities • DCM, 9.5.6, Safety and Protection Measures
	2.4 Security	
	2.4.1 Interfaces with Operations & Maintenance	
	2.4.1.1 TVA Mitigations	
IF 3894	2.4.1.1.1 Interface between O&M SEC TVA Mitigations and O&M Safety Operations	
	<u>Purpose/Scope:</u> Ensures that the applicable O&M threat and vulnerability mitigations have been addressed by the O&M team.	<ul style="list-style-type: none"> • Maintenance of Infrastructure, 1.3, Environmental Concerns • Maintenance of Infrastructure, 9.4, Right of Way Access
	3 Systems	
	3.1 Traction Power	
	3.1.1 Interfaces with Operations & Maintenance	
	3.1.1.1 Maintenance	
IF 878	3.1.1.1.1 Interface between O&M MoI TP Facility Site Access Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p>Purpose/Scope: Ensures that the O&M MoI TP facility site access requirements have been addressed by the INF team.</p>	<ul style="list-style-type: none"> • DCM, 7.7.1.1, Access Roads • DCM, 7.7.5.1, Parking Facilities for Wayside Facilities • DCM, 7.8.1.5, Gates • DCM, 7.8.3.2, Train Control, Communications and Traction Power Facilities • Drawing DD-CV-006, FENCE AND GATE DETAILS • Drawing DD-CV-007, FENCE AND GATES LOCATIONS • Drawing DD-SY-010, TYPICAL CIVIL ACCOMMODATIONS, SYSTEM SITES • Drawing DD-TP-D101, CONCEPTUAL LAYOUT TRACTION POWER SUBSTATION WITH TWO HIGH-VOLTAGE TRANSFORMERS • Drawing DD-TP-D102, CONCEPTUAL LAYOUT TRACTION POWER SUBSTATION WITH THREE HIGH-VOLTAGE TRANSFORMERS • Drawing DD-TP-D201, CONCEPTUAL LAYOUT SWITCHING STATION • Drawing DD-TP-D301, CONCEPTUAL LAYOUT PARALLELING STATION • Maintenance of Infrastructure, 2, CHST Infrastructure System And Maintainability • Maintenance of Infrastructure, 2.5, Structures • Maintenance of Infrastructure, 2.6, Electric Traction • Maintenance of Infrastructure, 9.4, Right of Way Access • Maintenance of Infrastructure, 9.6, Electric Power Transmission System (TPS)
	3.1.2 Interfaces with Guideway (excl. Trackwork)	
	3.1.2.1 Track Alignment	
IF 80	3.1.2.1.1 Interface between SYS TP Maximum Grade @ Phase Break Requirements and GWY Infrastructure	
	<p>Purpose/Scope: Ensures that the SYS TP system maximum grade @ phase break requirements have been addressed by the INF team.</p>	<ul style="list-style-type: none"> • DCM, 20.7.2, Spacing of Traction Power Facilities • DCM, 4.5.1, Maximum Grades
	3.1.2.2 Traction Power Facilities & Wayside Power Cubicles (Sites)	
IF 5597	3.1.2.2.1 Interface between SYS TP Facility & WPC Site Location Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	Purpose/Scope: Ensures that the SYS TP facility & WPC site location (where to install, not size) requirements have been addressed by the INF team.	<ul style="list-style-type: none">• DCM, 12.14.8, Niches• DCM, 13.16.14, Overhead Contact System Motorized Disconnect Switch• DCM, 13.16.4.1, Traction Power• DCM, 13.3.10, Equipment Requirements and Tunnel Niches• DCM, 20.12.1, Wayside Power Control Cubicles• DCM, 20.7.2, Spacing of Traction Power Facilities• DCM, 20.7.3, Additional Location Requirements• Drawing DD-TC-004, STATION INTERLOCKING LAYOUT-TYPICAL• Drawing DD-TC-005, UNIVERSAL INTERLOCKING LAYOUT-TYPICAL• Drawing DD-TC-025, TYPICAL INTERLOCKING AT STATIONS• Drawing DD-TC-026, TYPICAL UNIVERSAL INTERLOCKING LAYOUT• Drawing DD-TP-D401, CONCEPTUAL LOCATIONS, TRACTION POWER FACILITIES
IF 4271	3.1.2.2.2 Interface between SYS TP Facility & WPC Site Spatial Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the SYS TP facility & WPC site spatial (site, not location) requirements have been addressed by the INF team.</p>	<ul style="list-style-type: none"> • DCM, 12.14.8, Niches • DCM, 13.16.14, Overhead Contact System Motorized Disconnect Switch • DCM, 13.16.21, Parking for Tunnel Maintenance and Traction Power Facility • DCM, 13.3.10, Equipment Requirements and Tunnel Niches • DCM, 20.12.1, Wayside Power Control Cubicles • DCM, 20.9.1, General Site Requirements • DCM, 20.9.23, Real Estate Requirements: Approximate Footprints for the TPF • DCM, 3.3.2, Horizontal Clearances • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.1, Appendix 3.A Structure Gauge, Tangent Track • DCM, 3.7.2, Appendix 3.B Structure Gauge, Superelevated Track • DCM, 6.3, Protection of HST Operating Infrastructure from Vehicle Intrusion • DCM, 7.7.1.1, Access Roads • DCM, 7.7.5.1, Parking Facilities for Wayside Facilities • DCM, 7.8.1.5, Gates • DCM, 7.8.3.2, Train Control, Communications and Traction Power Facilities • DCM, 8.6.7, Facilities • Drawing DD-CV-006, FENCE AND GATE DETAILS • Drawing DD-TC-025, TYPICAL INTERLOCKING AT STATIONS • Drawing DD-TC-026, TYPICAL UNIVERSAL INTERLOCKING LAYOUT • Drawing DD-TP-D101, CONCEPTUAL LAYOUT TRACTION POWER SUBSTATION WITH TWO HIGH-VOLTAGE TRANSFORMERS • Drawing DD-TP-D102, CONCEPTUAL LAYOUT TRACTION POWER SUBSTATION WITH THREE HIGH-VOLTAGE TRANSFORMERS • Drawing DD-TP-D201, CONCEPTUAL LAYOUT SWITCHING STATION • Drawing DD-TP-D301, CONCEPTUAL LAYOUT PARALLELING STATION
IF 871	3.1.2.2.3 Interface between SYS TP Facility & WPC Site Foundation Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	Purpose/Scope: Ensures that the SYS TPF & WPC site foundation requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.7.2, Foundations for Equipment Enclosures • DCM, 20.12.1, Wayside Power Control Cubicles • DCM, 20.9.3, Foundations • DCM, 8.6.7, Facilities • Drawing DD-TC-004, STATION INTERLOCKING LAYOUT-TYPICAL • Drawing DD-TC-005, UNIVERSAL INTERLOCKING LAYOUT-TYPICAL • Drawing DD-TC-025, TYPICAL INTERLOCKING AT STATIONS • Drawing DD-TC-026, TYPICAL UNIVERSAL INTERLOCKING LAYOUT • Drawing DD-TP-D121, TRACTION POWER SUBSTATION HIGH VOLTAGE EQUIPMENT • Drawing DD-TP-D501, TYPICAL TRANSFORMER OIL CONTAINMENT SYSTEM • Drawing DD-TP-E112, TYPICAL EQUIPMENT ARRANGEMENT PREFABRICATED ENCLOSURES TRACTION POWER SUBSTATION-CABLE VAULT • Drawing DD-TP-E202, TYPICAL EQUIPMENT ARRANGEMENTS PREFABRICATED ENCLOSURES WAYSIDE POWER CONTROL CUBICLE-ELEVATION
	3.1.2.3 Wayside/Field Equipment	
IF 1143	3.1.2.3.1 Interface between SYS TP Wayside/Field Equipment Spatial Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the SYS TP wayside/field equipment spatial requirements have been addressed by the INF team.</p>	<ul style="list-style-type: none"> • DCM, 12.14.6, Trackside Equipment • DCM, 12.14.8, Niches • DCM, 13.3.10, Equipment Requirements and Tunnel Niches • DCM, 13.3.5, Clearances • DCM, 20.7.3, Additional Location Requirements • DCM, 3.3.1, Vertical Clearances • DCM, 3.3.2, Horizontal Clearances • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.1, Appendix 3.A Structure Gauge, Tangent Track • DCM, 3.7.2, Appendix 3.B Structure Gauge, Superelevated Track • DCM, 3.7.5, Appendix 3.E Fixed Equipment Envelope, Tangent Track • DCM, 3.7.6, Appendix 3.F Fixed Equipment Envelope, Superelevated Track • Drawing DD-TN-112, TYPICAL FIXED MOTORIZED DISCONNECT • Drawing DD-TP-D111, TRACTION POWER SUBSTATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW • Drawing DD-TP-D112, TRACTION POWER SUBSTATION MAIN GANTRY ELEVATION TRACK SIDE VIEW • Drawing DD-TP-D211, SWITCHING STATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW • Drawing DD-TP-D212, SWITCHING STATION MAIN GANTRY ELEVATION TRACK SIDE VIEW • Drawing DD-TP-D311, PARALLELING STATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW • Drawing DD-TP-D312, PARALLELING STATION MAIN GANTRY ELEVATION TRACK SIDE VIEW • Drawing DD-TP-D401, CONCEPTUAL LOCATIONS, TRACTION POWER FACILITIES • Drawing DD-TP-F101, TYPICAL SINGLE CATENARY FEEDING GANTRY ARRANGEMENT • Drawing DD-TP-F102, TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT • Drawing DD-TP-F201, TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT ON AERIAL STRUCTURE • Drawing DD-TP-F301, TYPICAL CATENARY FEEDING ARRANGEMENT IN OPEN TRENCH LOCATIONS
IF 5671	3.1.2.3.2 Interface between SYS TP Wayside/Field Equipment Foundation Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the SYS TP wayside/field equipment foundation requirements have been addressed by the INF team.</p>	<ul style="list-style-type: none"> • DCM, 12.14.6, Trackside Equipment • DCM, 12.5.3.2, Loads for Design of Traction Power Facility Gantry Pole Foundation • DCM, 12.8.9, OCS Pole Supports • DCM, 20.9.3, Foundations • DCM, 3.3.2, Horizontal Clearances • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.1, Appendix 3.A Structure Gauge, Tangent Track • DCM, 3.7.2, Appendix 3.B Structure Gauge, Superelevated Track • DCM, 3.7.5, Appendix 3.E Fixed Equipment Envelope, Tangent Track • DCM, 3.7.6, Appendix 3.F Fixed Equipment Envelope, Superelevated Track • Drawing DD-TP-D111, TRACTION POWER SUBSTATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW • Drawing DD-TP-D112, TRACTION POWER SUBSTATION MAIN GANTRY ELEVATION TRACK SIDE VIEW • Drawing DD-TP-D211, SWITCHING STATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW • Drawing DD-TP-D212, SWITCHING STATION MAIN GANTRY ELEVATION TRACK SIDE VIEW • Drawing DD-TP-D311, PARALLELING STATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW • Drawing DD-TP-D312, PARALLELING STATION MAIN GANTRY ELEVATION TRACK SIDE VIEW • Drawing DD-TP-D401, CONCEPTUAL LOCATIONS, TRACTION POWER FACILITIES • Drawing DD-TP-F101, TYPICAL SINGLE CATENARY FEEDING GANTRY ARRANGEMENT • Drawing DD-TP-F102, TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT • Drawing DD-TP-F201, TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT ON AERIAL STRUCTURE • Drawing DD-TP-F301, TYPICAL CATENARY FEEDING ARRANGEMENT IN OPEN TRENCH LOCATIONS
	3.1.2.4 Conduits & Cables	
IF 885	3.1.2.4.1 Interface between SYS TP Conduit, Duct Bank, Cable Trough & Manhole Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the SYS TP conduit, duct bank, cable trough & manhole requirements have been addressed by the INF team, including but not limited to:</p> <ul style="list-style-type: none"> • Overhead or duct bank from TPF to Main Gantry • Overhead from Main Gantry to Strain Gantry • Return System to Gantries • Feeder cables • Return cables • Surface conduits (multiple, large diameter) • Embedded conduits • ... 	<ul style="list-style-type: none"> • DCM, 12.14.4, Conduit Risers • DCM, 12.14.5, Embedded Conduits • DCM, 12.8.9, OCS Pole Supports • DCM, 13.15.3, Embedded Conduit and Cable Trough • DCM, 13.3.5, Clearances • DCM, 20.10.3, Raceway • DCM, 20.10.5, Electrical Manholes and Pullboxes • DCM, 20.10.6, Cable Trenches for Power Cables • DCM, 20.10.7, Conductors • DCM, 20.10.7.1, General • DCM, 20.10.7.2, Segregation • DCM, 20.10.7.3, Sizes of Low Voltage Power and Control Cables • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.5, Appendix 3.E Fixed Equipment Envelope, Tangent Track • DCM, 3.7.6, Appendix 3.F Fixed Equipment Envelope, Superelevated Track • Drawing DD-TP-D111, TRACTION POWER SUBSTATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW • Drawing DD-TP-D112, TRACTION POWER SUBSTATION MAIN GANTRY ELEVATION TRACK SIDE VIEW • Drawing DD-TP-D211, SWITCHING STATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW • Drawing DD-TP-D212, SWITCHING STATION MAIN GANTRY ELEVATION TRACK SIDE VIEW • Drawing DD-TP-D311, PARALLELING STATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW • Drawing DD-TP-D312, PARALLELING STATION MAIN GANTRY ELEVATION TRACK SIDE VIEW • Drawing DD-TP-D401, CONCEPTUAL LOCATIONS, TRACTION POWER FACILITIES • Drawing DD-TP-E202, TYPICAL EQUIPMENT ARRANGEMENTS PREFABRICATED ENCLOSURES WAYSIDE POWER CONTROL CUBICLE-ELEVATION • Drawing DD-TP-F101, TYPICAL SINGLE CATENARY FEEDING GANTRY ARRANGEMENT • Drawing DD-TP-F102, TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT • Drawing DD-TP-F201, TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT ON AERIAL STRUCTURE



ID	Interface	Document Reference(s)
	(continued)	<ul style="list-style-type: none"> • Drawing DD-TP-F301, TYPICAL CATENARY FEEDING ARRANGEMENT IN OPEN TRENCH LOCATIONS • Drawing DD-TP-G101, TYPICAL SUBSTATION NEUTRAL RETURN SYSTEM DIAGRAM • Drawing DD-TP-G111, TYPICAL SWITCHING STATION NEUTRAL RETURN SYSTEM DIAGRAM • Drawing DD-TP-N101, TYPICAL 25KV DUCT BANK DETAIL • Drawing DD-TP-N111, TYPICAL 25KV MANHOLE DETAILS
	3.1.2.5 Dead & Live Loads	
IF 3019	3.1.2.5.1 Interface between SYS TP System Dead Load Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS TP system dead load requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 20.9.3, Foundations • DCM, 12.5.3.1, Loads for Design of Overhead Contact System Pole Foundation • DCM, 12.5.3.2, Loads for Design of Traction Power Facility Gantry Pole Foundation
	3.1.2.6 Utilities	
IF 2606	3.1.2.6.1 Interface between SYS TP Utility Spatial Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS TP system utility spatial requirements have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • Traction power • Electrical utility (e.g. PG&E) • Gas/fuel • Water • Sewer • Communications 	<ul style="list-style-type: none"> • DCM, 20.4.6, High-Voltage Utility Connections • DCM, 20.9.23, Real Estate Requirements: Approximate Footprints for the TPF • DCM, 3.3.2, Horizontal Clearances • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.1, Appendix 3.A Structure Gauge, Tangent Track • DCM, 3.7.2, Appendix 3.B Structure Gauge, Superelevated Track • DCM, 9.4.1, Electrical • DCM, 9.4.1.3, Service Connections • Drawing DD-TP-C511, CONCEPTUAL LOCATIONS UTILITY HIGH VOLTAGE SWITCHING STATION AND TRACTION POWER SUBSTATION
	3.2 Overhead Contact System	
	3.2.1 Interfaces with Guideway (excl. Trackwork)	
	3.2.1.1 Pantograph Clearances	
IF 656	3.2.1.1.1 Interface between SYS OCS Pantograph Clearance Envelope Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the SYS OCS pantograph clearance envelope requirements have been addressed by the INF team (actual wayside equipment is addressed elsewhere).</p>	<ul style="list-style-type: none"> • DCM, 13.3.5, Clearances • DCM, 21.14.10, Applicable Pantograph and OCS Clearance Envelopes • DCM, 21.14.8, Electrical Clearances to Rail Vehicles and Structures • DCM, 21.14.9, Clearance Envelope at Fixed Structures • DCM, 21.6.2, Geometry of the Pantographs • DCM, 21.6.3, Compliance of the Overhead Contact Line System with the Infrastructure Gauge • DCM, 3.3.1, Vertical Clearances • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.1, Appendix 3.A Structure Gauge, Tangent Track • DCM, 3.7.2, Appendix 3.B Structure Gauge, Superelevated Track • DCM, 3.7.3, Appendix 3.C Composite Static Envelope and Dynamic Envelope, Tangent Track • DCM, 3.7.4, Appendix 3.D Composite Static Envelope and Dynamic Envelope, Superelevated Track • DCM, 3.7.5, Appendix 3.E Fixed Equipment Envelope, Tangent Track • DCM, 3.7.6, Appendix 3.F Fixed Equipment Envelope, Superelevated Track • Drawing DD-CV-010, MINIMUM CLEARANCE, GRADE SEPARATED STRUCTURES • Drawing DD-OC-2071, PANTOGRAPH CLEARANCE ENVELOPE OPEN ROUTE-DEDICATED TRACK-220 MPH SEGMENT • Drawing DD-OC-2072, PANTOGRAPH CLEARANCE ENVELOPE TUNNEL-DEDICATED TRACK-220 MPH SEGMENT • Drawing DD-TN-200, BASIC TUNNEL CONFIGURATION SINGLE TRACK TWIN TBM BORED TUNNEL DOUBLE TRAIN (1312 FT) • Drawing DD-TN-201, BASIC TUNNEL CONFIGURATION SINGLE TRACK TWIN TBM BORED TUNNEL SINGLE TRAIN (660 FT) • Drawing DD-TN-202, BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE MINED TUNNEL WITH SEPARATION WALL DOUBLE TRAIN (1312 FT) • Drawing DD-TN-203, BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE MINED TUNNEL WITH SEPARATION WALL SINGLE TRAIN (660 FT) • Drawing DD-TN-204, BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE MINED TUNNEL WITHOUT SEPARATION WALL, DOUBLE TRAIN (1312 FT) • Drawing DD-TN-205, BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE MINED TUNNEL WITHOUT SEPARATION WALL SINGLE TRAIN (660 FT) • Drawing DD-TN-206, BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE BORED TUNNEL WITHOUT SEPARATION WALL DOUBLE TRAIN (1312 FT)



ID	Interface	Document Reference(s)
	(continued)	<ul style="list-style-type: none"> • Drawing DD-TN-207, BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE BORED TUNNEL WITHOUT SEPARATION WALL SINGLE TRAIN (660 FT) • Drawing DD-TN-300, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT SINGLE TRACK TWIN TBM BORED TUNNEL • Drawing DD-TN-301, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT TWIN TRACK SINGLE MINED TUNNEL • Drawing DD-TN-302, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT TYPICAL CROSS SECTION-TWIN TRACK SINGLE MINED TUNNEL WITHOUT SEPARATION WALL • Drawing DD-TN-303, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT-TWIN TRACK SINGLE BORED (TBM/ CIRCULAR) TUNNEL WITHOUT SEPARATION WALL
	3.2.1.2 Wayside/Field Equipment	
IF 3299	3.2.1.2.1 Interface between SYS OCS Structure & Wire Spatial Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the SYS OCS structure & wire spatial requirements have been addressed by the INF team.</p>	<ul style="list-style-type: none"> • DCM, 13.3.5, Clearances • DCM, 21.1, Scope • DCM, 21.12, Sectionalizing and Switching • DCM, 21.14.7, Clearances for Utility Lines Crossing over the Electrified Railroad • DCM, 21.14.8, Electrical Clearances to Rail Vehicles and Structures • DCM, 21.14.9, Clearance Envelope at Fixed Structures • DCM, 21.15.1, General • DCM, 21.15.2, OCS Pole and Foundation Requirements • DCM, 21.15.3, OCS Poles • DCM, 21.16, Traction Power Return System • DCM, 21.6.1, Geometry of the Overhead Contact Line • DCM, 21.6.2, Geometry of the Pantographs • DCM, 21.6.3, Compliance of the Overhead Contact Line System with the Infrastructure Gauge • DCM, 21.8.1, Contact Wire • DCM, 21.8.2, Messenger Wire • DCM, 21.8.3, Stitch Wire • DCM, 21.8.4, Hanger Wire • DCM, 21.8.5, Alternate Conductors • DCM, 21.9, Other Overhead Conductors and Cables • DCM, 21.9.1, Parallel Negative Feeder • DCM, 21.9.2, Static (Ground) Wire • DCM, 21.9.3, Insulated 25 kV Cable • DCM, 21.9.4, Insulated Return Cable • DCM, 3.3.1, Vertical Clearances • DCM, 3.3.2, Horizontal Clearances • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.5, Track Center Spacing • DCM, 9.5.5, Utility Clearances • Drawing DD-OC-2011, TYPICAL OPEN ROUTE HIGH SPEED OCS CONFIGURATION - 220 MPH SEGMENT • Drawing DD-OC-2020, TYPICAL OCS STRUCTURE FOR CIRCULAR TUNNEL ON TANGENT TRACKS-220 MPH SEGMENT • Drawing DD-OC-2021, TYPICAL OCS STRUCTURE FOR MINED TUNNEL ON TANGENT TRACKS-220 MPH SEGMENT



ID	Interface	Document Reference(s)
	(continued)	<ul style="list-style-type: none"> • Drawing DD-OC-2029, TYPICAL OCS PORTAL STRUCTURE OPEN TRENCH/TUNNEL PORTAL ON TANGENT TRACKS-220 MPH SEGMENT • Drawing DD-OC-2035, TYPICAL CIRCULAR TUNNEL OCS STRUCTURE WITHOUT CENTER WALL ON TANGENT TRACKS-220 MPH SEGMENT • Drawing DD-OC-2036, TYPICAL MINED TUNNEL OCS STRUCTURE WITHOUT CENTER WALL ON TANGENT TRACKS-220 MPH SEGMENT • Drawing DD-OC-2037, TYPICAL CUT & COVER TUNNEL OCS STRUCTURE WITHOUT CENTER WALL ON TANGENT TRACKS-220 MPH SEGMENT • Drawing DD-OC-2041, TYPICAL JUMPER AND CONTACT WIRE CROSSING ARRANGEMENTS-220 MPH SEGMENT • Drawing DD-OC-2042, TYPICAL 25KV HIGH SPEED SECTION INSULATOR ARRANGEMENT FOR CROSSOVER AND TURNOUT-220 MPH SEGMENT • Drawing DD-OC-2050, TYPICAL OCS CROSSOVER ARRANGEMENT WITH AIR GAP-220 MPH SEGMENT • Drawing DD-OC-2053, TYPICAL UNINSULATED CATENARY OVERLAP FIVE SPAN ARRANGEMENT-220 MPH SEGMENT • Drawing DD-OC-2057, TYPICAL INSULATED CATENARY OVERLAP FIVE SPAN ARRANGEMENT-220 MPH SEGMENT • Drawing DD-OC-2058, TYPICAL CANTILEVER ARRANGEMENT FIVE SPAN INSULATED AND UNINSULATED OVERLAPS-220 MPH SEGMENT



ID	Interface	Document Reference(s)
	(continued)	<ul style="list-style-type: none"> • Drawing DD-CV-010, MINIMUM CLEARANCE, GRADE SEPARATED STRUCTURES • Drawing DD-OC-2011, TYPICAL OPEN ROUTE HIGH SPEED OCS CONFIGURATION - 220 MPH SEGMENT • Drawing DD-OC-2012, TYPICAL OCS STRUCTURE FOR TANGENT TRACKS IN OPEN ROUTE - 220 MPH SEGMENT • Drawing DD-OC-2013, TYPICAL OCS STRUCTURE FOR TWO CURVED TRACKS IN OPEN ROUTE - 220 MPH SEGMENT • Drawing DD-OC-2014, TYPICAL OCS SUPPORT STRUCTURE ON VIADUCT-TANGENT TRACKS - 220 MPH SEGMENT • Drawing DD-OC-2015, TYPICAL OCS SUPPORT STRUCTURE ON VIADUCT-CURVED TRACKS - 220 MPH SEGMENT • Drawing DD-OC-2016, TYPICAL OCS PORTAL STRUCTURE ARRANGEMENT ON TANGENT TRACK WITH TURNOUT - 220 MPH SEGMENT • Drawing DD-OC-2017, TYPICAL OCS PORTAL STRUCTURE ARRANGEMENT ON THREE CURVED TRACKS? 220 MPH SEGMENT • Drawing DD-OC-2018, TYPICAL OCS PORTAL STRUCTURE ON FOUR TANGENT TRACKS - 220 MPH SEGMENT • Drawing DD-OC-2019, TYPICAL OCS SUPPORT STRUCTURE FOR 4 TRACKS INTERMEDIATE STATION-220 MPH SEGMENT • Drawing DD-OC-2022, TYPICAL OCS STRUCTURE FOR CUT AND COVER TUNNEL ON TANGENT TRACKS-220 MPH SEGMENT • Drawing DD-OC-2023, TYPICAL OPEN TRENCH OCS STRUCTURE TANGENT TRACKS WITH CENTER WALKWAY-220 MPH SEGMENT • Drawing DD-OC-2024, TYPICAL OPEN TRENCH OCS STRUCTURE CURVED TRACKS WITH CENTER WALKWAY-220 MPH SEGMENT • Drawing DD-OC-2025, TYPICAL OPEN TRENCH OCS STRUCTURE ON TANGENT TRACK WITH SIDE WALKWAY-220 MPH SEGMENT • Drawing DD-OC-2026, TYPICAL OPEN TRENCH OCS STRUCTURE ON CURVED TRACK WITH SIDE WALKWAY-220 MPH SEGMENT • Drawing DD-OC-2027, TYPICAL SINGLE OPEN TRENCH OCS STRUCTURE OCS WALL MOUNTED ON TANGENT TRACKS-220 MPH SEGMENT • Drawing DD-OC-2028, TYPICAL SINGLE OPEN TRENCH OCS STRUCTURE OCS WALL MOUNTED ON CURVED TRACKS-220 MPH SEGMENT
IF 5752	3.2.1.2.2 Interface between SYS OCS Wayside/Field Equipment Spatial Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the SYS OCS wayside/field equipment spatial requirements have been addressed by the INF team.</p>	<ul style="list-style-type: none"> • DCM, 13.16.14, Overhead Contact System Motorized Disconnect Switch • DCM, 13.17.1, A Shorter Tunnel up to One-Half Mile in Length • DCM, 13.17.3, Shorter Tunnel with Constrained Access • DCM, 13.3.10, Equipment Requirements and Tunnel Niches • DCM, 13.3.5, Clearances • DCM, 21.1, Scope • DCM, 21.12.2, Phase Breaks • DCM, 21.12.3, OCS Sectionalizing in Tunnels • DCM, 21.12.4, Disconnect Switches • DCM, 21.14.8, Electrical Clearances to Rail Vehicles and Structures • DCM, 21.14.9, Clearance Envelope at Fixed Structures • DCM, 21.4, Overhead Contact System Description and General Performance Requirements • DCM, 21.6.1, Geometry of the Overhead Contact Line • DCM, 21.6.3, Compliance of the Overhead Contact Line System with the Infrastructure Gauge • DCM, 3.3.1, Vertical Clearances • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.5, Appendix 3.E Fixed Equipment Envelope, Tangent Track • DCM, 3.7.6, Appendix 3.F Fixed Equipment Envelope, Superelevated Track • Drawing DD-OC-2030, TYPICAL TWIN BALANCE WEIGHT ARRANGEMENT TERMINATION IN OPEN ROUTE-220 MPH SEGMENT • Drawing DD-OC-2031, TYPICAL OCS MIDPOINT ANCHOR ARRANGEMENT IN OPEN ROUTE-220 MPH SEGMENT • Drawing DD-OC-2032, TYPICAL OCS FIXED TENSION TERMINATION ARRANGEMENT-OPEN ROUTE-220 MPH SEGMENT • Drawing DD-OC-2033, TYPICAL OCS SUPPORT WITH AUXILIARY POWER FOR TWO TANGENT TRACKS IN OPEN ROUTE-220 MPH SEGMENT • Drawing DD-OC-2034, TYPICAL OCS SUPPORT STRUCTURE WITH DISCONNECT SWITCH-220 MPH SEGMENT • Drawing DD-OC-2038, TYPICAL BORED TUNNEL OCS STRUCTURE WITH DISCONNECT SWITCH ARRANGEMENT-220 MPH SEGMENT
IF 5766	3.2.1.2.3 Interface between SYS OCS Phase Break Spatial Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<u>Purpose/Scope:</u> Ensures that the SYS OCS wayside/field equipment spatial requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 20.7.3, Additional Location Requirements • DCM, 21.12.2, Phase Breaks • DCM, 21.4, Overhead Contact System Description and General Performance Requirements • DCM, 3.3.1, Vertical Clearances • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.5, Appendix 3.E Fixed Equipment Envelope, Tangent Track • DCM, 3.7.6, Appendix 3.F Fixed Equipment Envelope, Superelevated Track • Drawing DD-OC-2043, TYPICAL OCS PHASE BREAK ARRANGEMENT WITH NEUTRAL SECTION- 220 MPH SEGMENT
	3.2.1.3 Foundations & Support Structures	
IF 898	3.2.1.3.1 Interface between SYS OCS Foundation & Supporting Structure Location Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS OCS foundation & supporting structure location requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.14.9, Overhead Anchors • DCM, 12.5.3.1, Loads for Design of Overhead Contact System Pole Foundation • DCM, 12.8.9, OCS Pole Supports • DCM, 13.15.1, Catenary Support Provisions • DCM, 21.15.1, General • DCM, 21.15.2, OCS Pole and Foundation Requirements • DCM, 21.15.3, OCS Poles • DCM, 21.6.1, Geometry of the Overhead Contact Line • Drawing DD-OC-2011, TYPICAL OPEN ROUTE HIGH SPEED OCS CONFIGURATION - 220 MPH SEGMENT
IF 5780	3.2.1.3.2 Interface between SYS OCS Foundation & Supporting Structure Spatial Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS OCS foundation & supporting structure spatial requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.14.9, Overhead Anchors • DCM, 12.5.3.1, Loads for Design of Overhead Contact System Pole Foundation • DCM, 12.8.9, OCS Pole Supports • DCM, 13.15.1, Catenary Support Provisions • DCM, 21.15.1, General • DCM, 21.15.2, OCS Pole and Foundation Requirements • DCM, 21.15.4, OCS Foundations • Drawing DD-ST-004, AERIAL STRUCTURE, CABLE TROUGH DETAILS, AT OCS POLE
	3.2.1.4 Conduits & Cables	



ID	Interface	Document Reference(s)
IF 886	3.2.1.4.1 Interface between SYS OCS Conduit, Duct Bank & Manhole Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS OCS conduit, duct bank & manhole requirements have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • Traction power return • Grounding • Cross bonding • Disconnect switches • Switch heater power supply • Switch heater power distribution • ... 	<ul style="list-style-type: none"> • DCM, 12.14.4, Conduit Risers • DCM, 12.14.5, Embedded Conduits • DCM, 12.8.9, OCS Pole Supports • DCM, 13.15.3, Embedded Conduit and Cable Trough • DCM, 21.17.1, Traction Power Supply System • DCM, 21.17.3, Train Control System • DCM, 21.17.4, Communications System • DCM, 21.17.6, Trackwork • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.5, Appendix 3.E Fixed Equipment Envelope, Tangent Track • DCM, 3.7.6, Appendix 3.F Fixed Equipment Envelope, Superelevated Track • Drawing DD-OC-2033, TYPICAL OCS SUPPORT WITH AUXILIARY POWER FOR TWO TANGENT TRACKS IN OPEN ROUTE-220 MPH SEGMENT • Drawing DD-OC-2034, TYPICAL OCS SUPPORT STRUCTURE WITH DISCONNECT SWITCH-220 MPH SEGMENT • Drawing DD-OC-2038, TYPICAL BORED TUNNEL OCS STRUCTURE WITH DISCONNECT SWITCH ARRANGEMENT-220 MPH SEGMENT
	3.2.1.5 Dead & Live Loads	
IF 3018	3.2.1.5.1 Interface between SYS OCS Dead Load, Additional Load & Capacity Protection Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS OCS dead load, additional load and capacity protection requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 21.15.2, OCS Pole and Foundation Requirements • DCM, 21.15.3, OCS Poles • DCM, 21.15.4, OCS Foundations • DCM, 12.5.1.1, Dead Load (DC, DW) • DCM, 12.5.3.1, Loads for Design of Overhead Contact System Pole Foundation • DCM, 12.8.9, OCS Pole Supports
	3.2.1.6 Protective Screens	
IF 5641	3.2.1.6.1 Interface between SYS OCS Protective Screening & Barrier Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<u>Purpose/Scope:</u> Ensures that the SYS OCS protective screening & barrier requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 21.14, OCS Clearances and Protection against Electric Shock • DCM, 21.14.2, Protection by Clearances from Standing Surfaces • DCM, 21.14.3, Protective Screening and Barriers for Standing Surfaces in Public Areas • DCM, 21.14.4, Protective Screening and Barriers for Standing Surfaces in Restricted Areas • DCM, 7.8.4.2, Roadway Overpasses Crossing HST Trackway • Drawing DD-CV-008, FENCING ON GRADE SEPARATED STRUCTURES • Drawing DD-CV-008, FENCING ON GRADE SEPARATED STRUCTURES • Drawing DD-OC-2044, TYPICAL PROTECTION BARRIERS ARRANGEMENT, AT OVERHEAD BRIDGE, 220 MPH SEGMENT
	3.3 Automatic Train Control	
	3.3.1 Interfaces with Operations & Maintenance	
	3.3.1.1 Maintenance	
IF 831	3.3.1.1.1 Interface between O&M Mol ATC Interlocking & TCC House Site Access Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M Mol ATC Interlocking & TCC house site access requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 7.7.1.1, Access Roads • DCM, 7.7.5.1, Parking Facilities for Wayside Facilities • DCM, 7.8.1.5, Gates • DCM, 7.8.3.2, Train Control, Communications and Traction Power Facilities • Drawing DD-CV-006, FENCE AND GATE DETAILS • Drawing DD-CV-007, FENCE AND GATES LOCATIONS • Drawing DD-SY-010, TYPICAL CIVIL ACCOMMODATIONS, SYSTEM SITES • Drawing DD-TC-025, TYPICAL INTERLOCKING AT STATIONS • Drawing DD-TC-026, TYPICAL UNIVERSAL INTERLOCKING LAYOUT • Maintenance of Infrastructure, 2.2, Interlockings • Maintenance of Infrastructure, 2.4, Operating and Communications Systems • Maintenance of Infrastructure, 2.5, Structures • Maintenance of Infrastructure, 3.2, CHST Infrastructure Support Facilities • Maintenance of Infrastructure, 9.3.5, Signal System • Maintenance of Infrastructure, 9.4, Right of Way Access
	3.3.2 Interfaces with Guideway (excl. Trackwork)	
	3.3.2.1 Interlockings / TCC Houses (Sites)	
IF 5611	3.3.2.1.1 Interface between SYS ATC Interlocking & TCC House Site Location Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<u>Purpose/Scope:</u> Ensures that the SYS ATC interlocking & TCC house site location (where to install, not size) requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 24.3.12, Hardware Requirements • DCM, 24.8.8, Equipment Enclosures • Drawing DD-TC-025, TYPICAL INTERLOCKING AT STATIONS • Drawing DD-TC-026, TYPICAL UNIVERSAL INTERLOCKING LAYOUT
IF 794	3.3.2.1.2 Interface between SYS ATC Interlocking & TCC House Site Spatial Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS ATC interlocking & TCC house site spatial requirements (site, not location) have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 24.3.12, Hardware Requirements • DCM, 24.8.8, Equipment Enclosures • DCM, 3.3.2, Horizontal Clearances • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.1, Appendix 3.A Structure Gauge, Tangent Track • DCM, 3.7.2, Appendix 3.B Structure Gauge, Superelevated Track • DCM, 6.3, Protection of HST Operating Infrastructure from Vehicle Intrusion • DCM, 7.7.1.1, Access Roads • DCM, 7.7.5.1, Parking Facilities for Wayside Facilities • DCM, 7.8.1.5, Gates • DCM, 7.8.3.2, Train Control, Communications and Traction Power Facilities • DCM, 8.6.7, Facilities • Drawing DD-CV-006, FENCE AND GATE DETAILS • Drawing DD-TC-025, TYPICAL INTERLOCKING AT STATIONS • Drawing DD-TC-026, TYPICAL UNIVERSAL INTERLOCKING LAYOUT
IF 1049	3.3.2.1.3 Interface between SYS ATC Interlocking & TCC House Site Foundation Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS ATC interlocking & TCC house site foundation requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.7.2, Foundations for Equipment Enclosures • DCM, 24.3, General Design Requirements • DCM, 24.3.12, Hardware Requirements • DCM, 8.6.7, Facilities • Drawing DD-TC-025, TYPICAL INTERLOCKING AT STATIONS • Drawing DD-TC-026, TYPICAL UNIVERSAL INTERLOCKING LAYOUT
	3.3.2.2 Wayside/Field Equipment	
IF 3304	3.3.2.2.1 Interface between SYS ATC Wayside/Field Equipment Spatial Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the SYS ATC wayside/field equipment (not trackside) spatial requirements have been addressed by the INF team.</p>	<ul style="list-style-type: none"> • DCM, 12.14.6, Trackside Equipment • DCM, 12.14.8, Niches • DCM, 13.3.10, Equipment Requirements and Tunnel Niches • DCM, 13.3.5, Clearances • DCM, 24.3.12, Hardware Requirements • DCM, 24.8, Wayside Equipment • DCM, 24.8.1, Signals • DCM, 24.8.2, Wayside Signs • DCM, 24.8.3, Track Circuits • DCM, 24.8.7, Switch Machines • DCM, 24.8.8, Equipment Enclosures • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.6.4, Space Around Turnouts • DCM, 3.7.5, Appendix 3.E Fixed Equipment Envelope, Tangent Track • DCM, 3.7.6, Appendix 3.F Fixed Equipment Envelope, Superelevated Track • Drawing DD-ST-001, AERIAL STRUCTURE, TWO TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK • Drawing DD-ST-010, TYPICAL CROSS SECTION, FOR TWO TRACK TRENCH, OUTSIDE WALKWAY • Drawing DD-TC-009, TYPICAL DWARF SIGNAL LAYOUT • Drawing DD-TC-011, SWITCH LAYOUT-MAIN LINE-HIGH SPEED-TYPICAL • Drawing DD-TN-111, TYPICAL ATC EQUIPMENT • Drawing DD-TN-113, ATC SIGNALING AND COMMUNICATION SYSTEMS • Drawing DD-TN-300, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT SINGLE TRACK TWIN TBM BORED TUNNEL • Drawing DD-TN-301, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT TWIN TRACK SINGLE MINED TUNNEL • Drawing DD-TN-302, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT TYPICAL CROSS SECTION-TWIN TRACK SINGLE MINED TUNNEL WITHOUT SEPARATION WALL • Drawing DD-TN-303, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT-TWIN TRACK SINGLE BORED (TBM/ CIRCULAR) TUNNEL WITHOUT SEPARATION WALL



ID	Interface	Document Reference(s)
IF 5627	3.3.2.2.2 Interface between SYS ATC Wayside/Field Equipment Foundation Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS ATC wayside/field equipment foundation requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 24.3, General Design Requirements • DCM, 24.3.12, Hardware Requirements • DCM, 24.8.1, Signals • DCM, 24.8.2, Wayside Signs • DCM, 24.8.3, Track Circuits • DCM, 24.8.7, Switch Machines • DCM, 24.8.8, Equipment Enclosures • Drawing DD-TC-009, TYPICAL DWARF SIGNAL LAYOUT • Drawing DD-TC-011, SWITCH LAYOUT-MAIN LINE-HIGH SPEED-TYPICAL • DCM, 12.14.6, Trackside Equipment • DCM, 12.8.9, OCS Pole Supports
	3.3.2.3 Conduits & Cables	
IF 876	3.3.2.3.1 Interface between SYS ATC Conduit, Duct Bank, Cable Trough & Manhole Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the SYS ATC conduit, duct bank, cable trough & manhole requirements have been addressed by the INF team, including but not limited to:</p> <ul style="list-style-type: none"> • Track circuits & cases • Signals • Transponder & LEU • Cross bonding • Signal power supply • Signal power distribution • ... 	<ul style="list-style-type: none"> • DCM, 12.14.1, Cable Trough • DCM, 12.14.4, Conduit Risers • DCM, 12.14.5, Embedded Conduits • DCM, 13.15.3, Embedded Conduit and Cable Trough • DCM, 13.15.5, Design Requirements for Cable Troughs • DCM, 24.3.12, Hardware Requirements • DCM, 24.8.10, Cables, Cable Trough, and Conduit • DCM, 24.8.13, Signal Power • DCM, 28.5.6, Systems Conduits at Track • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.5, Appendix 3.E Fixed Equipment Envelope, Tangent Track • DCM, 3.7.6, Appendix 3.F Fixed Equipment Envelope, Superelevated Track • DCM, 7.7.7, Walkways and Cable Trough • Drawing DD-CO-G021, TYPICAL CROSS SECTION, SYSTEMS LOW VOLTAGE, CONDUIT DUCT BANK • Drawing DD-CO-G022, TYPICAL SECTION, SYSTEMS LOW VOLTAGE, UNDER TRACK CONDUCT DUCT BANK, AT-GRADE • Drawing DD-CO-G023, TYPICAL CROSS SECTION, SYSTEMS LOW VOLTAGE, UNDER TRACK / UNDERGROUND CONDUCT DUCT BANK, AT-GRADE • Drawing DD-CO-G024, TYPICAL CROSS SECTION, SYSTEMS LOW VOLTAGE, UNDERGROUND CONDUIT DUCTBANK INSTALLATIONS, TWO TRACK TRENCH • Drawing DD-CV-001, TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, EMBANKMENT • Drawing DD-ST-001, AERIAL STRUCTURE, TWO TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK • Drawing DD-ST-003, AERIAL STRUCTURE, TYPICAL CABLE TROUGH DETAILS • Drawing DD-ST-004, AERIAL STRUCTURE, CABLE TROUGH DETAILS, AT OCS POLE • Drawing DD-ST-010, TYPICAL CROSS SECTION, FOR TWO TRACK TRENCH, OUTSIDE WALKWAY



ID	Interface	Document Reference(s)
	(continued)	<ul style="list-style-type: none"> • Drawing DD-ST-011, CABLE TROUGH DETAILS, TRENCH / CUT AND COVER TUNNEL • Drawing DD-ST-012, CABLE TROUGH LAYOUT TRANSITION AREAS • Drawing DD-ST-013, TYPICAL CABLE TROUGH DETAILS, EMBANKMENT/CUT • Drawing DD-SY-010, TYPICAL CIVIL ACCOMMODATIONS, SYSTEM SITES • Drawing DD-TC-004, STATION INTERLOCKING LAYOUT-TYPICAL • Drawing DD-TC-005, UNIVERSAL INTERLOCKING LAYOUT-TYPICAL • Drawing DD-TN-113, ATC SIGNALING AND COMMUNICATION SYSTEMS • Drawing DD-TN-300, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT SINGLE TRACK TWIN TBM BORED TUNNEL
	(continued)	<ul style="list-style-type: none"> • Drawing DD-TN-301, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT TWIN TRACK SINGLE MINED TUNNEL • Drawing DD-TN-302, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT TYPICAL CROSS SECTION-TWIN TRACK SINGLE MINED TUNNEL WITHOUT SEPARATION WALL • Drawing DD-TN-303, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT-TWIN TRACK SINGLE BORED (TBM/ CIRCULAR) TUNNEL WITHOUT SEPARATION WALL
	3.3.2.4 Dead & Live Loads	
IF 3017	3.3.2.4.1 Interface between SYS ATC System Dead Load Requirements and GWY Infrastructure	
	Purpose/Scope: Ensures that the SYS ATC system dead load requirements have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • Wayside facilities 	<ul style="list-style-type: none"> • DCM, 24.8, Wayside Equipment • DCM, 12.5.1.1, Dead Load (DC, DW) • DCM, 12.5.3.1, Loads for Design of Overhead Contact System Pole Foundation
	3.3.2.5 Utilities	
IF 2611	3.3.2.5.1 Interface between SYS ATC System Utility Spatial Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<u>Purpose/Scope:</u> Ensures that the SYS ATC system utility spatial requirements have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • Electrical utility (e.g. PG&E) • Gas/fuel • Water • Sewer • Communications 	<ul style="list-style-type: none"> • DCM, 24.3.12, Hardware Requirements • DCM, 24.8.13, Signal Power • DCM, 24.8.15, Wayside Interfaces • DCM, 9.4.1, Electrical • DCM, 9.4.1.3, Service Connections
	3.4 Communications	
	3.4.1 Interfaces with Operations & Maintenance	
	3.4.1.1 Maintenance	
IF 5871	3.4.1.1.1 Interface between O&M MoI COM Equipment Shelter & Radio Tower Site Access Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M MoI COM equipment shelter & radio tower site access requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 7.7.1.1, Access Roads • DCM, 7.7.5.1, Parking Facilities for Wayside Facilities • DCM, 7.8.1.5, Gates • DCM, 7.8.3.2, Train Control, Communications and Traction Power Facilities • Drawing DD-CO-F090, STANDALONE RADIO SITE COMMUNICATIONS SPACES SITE LAYOUT • Drawing DD-CV-006, FENCE AND GATE DETAILS • Drawing DD-CV-007, FENCE AND GATES LOCATIONS • Drawing DD-SY-010, TYPICAL CIVIL ACCOMMODATIONS, SYSTEM SITES • Maintenance of Infrastructure, 2, CHST Infrastructure System And Maintainability • Maintenance of Infrastructure, 2.4, Operating and Communications Systems • Maintenance of Infrastructure, 2.5, Structures • Maintenance of Infrastructure, 9.4, Right of Way Access
	3.4.2 Interfaces with Guideway (excl. Trackwork)	
	3.4.2.1 Equipment Shelter (Sites)	
IF 5653	3.4.2.1.1 Interface between SYS COM Equipment Shelter & Radio Tower Site Location Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the SYS COM equipment shelter & radio tower site location (where to install, not size) requirements have been addressed by the INF team.</p>	
	<p><u>Specification:</u> Defines SYS COM equipment shelter & radio tower site location requirements, specified by the SYS team, including but not limited to:</p> <ul style="list-style-type: none"> • Wayside communications equipment shelter • Radio towers • ... 	<ul style="list-style-type: none"> • DCM, 28.4.5.1, Operations Radio System • DCM, 28.4.5.3, Broadband Radio System • DCM, 28.5.4, Standalone Radio Sites • Drawing DD-CO-C001, COMMUNICATIONS SYSTEMS SITES AND LOCATIONS OVERVIEW • Drawing DD-CO-F090, STANDALONE RADIO SITE COMMUNICATIONS SPACES SITE LAYOUT • Drawing DD-CO-F091, CO-LOCATED RADIO SITE COMMUNICATIONS SPACES SITE LAYOUT • Drawing DD-CO-H001, STANDALONE RADIO SITE KEY PLAN • Drawing DD-TC-025, TYPICAL INTERLOCKING AT STATIONS • Drawing DD-TC-026, TYPICAL UNIVERSAL INTERLOCKING LAYOUT • Drawing DD-TP-D101, CONCEPTUAL LAYOUT TRACTION POWER SUBSTATION WITH TWO HIGH-VOLTAGE TRANSFORMERS • Drawing DD-TP-D102, CONCEPTUAL LAYOUT TRACTION POWER SUBSTATION WITH THREE HIGH-VOLTAGE TRANSFORMERS • Drawing DD-TP-D201, CONCEPTUAL LAYOUT SWITCHING STATION • Drawing DD-TP-D301, CONCEPTUAL LAYOUT PARALLELING STATION
IF 904	3.4.2.1.2 Interface between SYS COM Equipment Shelter & Radio Tower Site Spatial Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<u>Purpose/Scope:</u> Ensures that the SYS COM equipment shelter & radio tower site spatial requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 28.4.1.4, General Communications Systems Physical, Enclosure and Power • DCM, 28.5.3, Communications Shelters • DCM, 28.5.4, Standalone Radio Sites • DCM, 3.3.2, Horizontal Clearances • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 6.3, Protection of HST Operating Infrastructure from Vehicle Intrusion • DCM, 7.7.1.1, Access Roads • DCM, 7.7.5.1, Parking Facilities for Wayside Facilities • DCM, 7.8.1.5, Gates • DCM, 7.8.3.2, Train Control, Communications and Traction Power Facilities • DCM, 8.6.7, Facilities • Drawing DD-CO-F070, SIGNALING EQUIPMENT HOUSE COMMUNICATIONS SPACES SITE LAYOUT • Drawing DD-CO-F080, TRACTION POWER FACILITY COMMUNICATIONS SPACES SITE LAYOUT • Drawing DD-CO-F090, STANDALONE RADIO SITE COMMUNICATIONS SPACES SITE LAYOUT • Drawing DD-CO-F091, CO-LOCATED RADIO SITE COMMUNICATIONS SPACES SITE LAYOUT • Drawing DD-CO-F110, TUNNEL CROSS PASSAGE COMMUNICATIONS SPACES SITE LAYOUT • Drawing DD-CV-006, FENCE AND GATE DETAILS
IF 1048	3.4.2.1.3 Interface between SYS COM Equipment Shelter & Radio Tower Site Foundation Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS COM equipment shelter & radio tower site foundation requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 28.5.5, Radio Towers • Drawing DD-CO-F070, SIGNALING EQUIPMENT HOUSE COMMUNICATIONS SPACES SITE LAYOUT • Drawing DD-CO-F080, TRACTION POWER FACILITY COMMUNICATIONS SPACES SITE LAYOUT • Drawing DD-CO-F090, STANDALONE RADIO SITE COMMUNICATIONS SPACES SITE LAYOUT • Drawing DD-CO-F091, CO-LOCATED RADIO SITE COMMUNICATIONS SPACES SITE LAYOUT • DCM, 12.7.2, Foundations for Equipment Enclosures • DCM, 8.6.7, Facilities
	3.4.2.2 Wayside/Field Equipment	
IF 600	3.4.2.2.1 Interface between SYS COM Wayside/Field Equipment Spatial Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the SYS COM wayside/field equipment spatial requirements have been addressed by the INF team.</p>	<ul style="list-style-type: none"> • DCM, 12.14.6, Trackside Equipment • DCM, 12.14.8, Niches • DCM, 13.3.10, Equipment Requirements and Tunnel Niches • DCM, 13.3.5, Clearances • DCM, 28.4.1.4, General Communications Systems Physical, Enclosure and Power • DCM, 28.4.1.5, General Communications Systems End-Devices • DCM, 28.4.11.1, Telephone Subsystem • DCM, 28.4.5.2, Operations Radio System at Trench and Tunnel Locations • DCM, 28.4.5.4, Broadband Radio System at Trench and Tunnel Locations • DCM, 28.4.5.5, Public Safety Trench and Tunnel Radio System • DCM, 28.4.5.6, Radio Interoperability with External Agencies and First Responders • DCM, 28.5.2, Communications Interface Cabinets • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.5, Appendix 3.E Fixed Equipment Envelope, Tangent Track • DCM, 3.7.6, Appendix 3.F Fixed Equipment Envelope, Superelevated Track • Drawing DD-CO-F100, WAYSIDE CIC COMMUNICATIONS SPACES SITE LAYOUT • Drawing DD-ST-001, AERIAL STRUCTURE, TWO TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK • Drawing DD-ST-010, TYPICAL CROSS SECTION, FOR TWO TRACK TRENCH, OUTSIDE WALKWAY • Drawing DD-TN-111, TYPICAL ATC EQUIPMENT • Drawing DD-TN-113, ATC SIGNALING AND COMMUNICATION SYSTEMS • Drawing DD-TN-300, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT SINGLE TRACK TWIN TBM BORED TUNNEL • Drawing DD-TN-301, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT TWIN TRACK SINGLE MINED TUNNEL • Drawing DD-TN-302, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT TYPICAL CROSS SECTION-TWIN TRACK SINGLE MINED TUNNEL WITHOUT SEPARATION WALL • Drawing DD-TN-303, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT-TWIN TRACK SINGLE BORED (TBM/ CIRCULAR) TUNNEL WITHOUT SEPARATION WALL
IF 5725	3.4.2.2.2 Interface between SYS COM Wayside/Field Equipment Foundation Requirements and GWY Infrastructure	



<i>ID</i>	<i>Interface</i>	<i>Document Reference(s)</i>
	<u>Purpose/Scope:</u> Ensures that the SYS COM wayside/field equipment foundation requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 28.4.1.4, General Communications Systems Physical, Enclosure and Power • DCM, 28.4.1.5, General Communications Systems End-Devices • DCM, 28.5.2, Communications Interface Cabinets • Drawing DD-CO-F100, WAYSIDE CIC COMMUNICATIONS SPACES SITE LAYOUT • DCM, 12.14.6, Trackside Equipment • DCM, 12.8.9, OCS Pole Supports
	3.4.2.3 Conduits & Cables	
IF 877	3.4.2.3.1 Interface between SYS COM Conduit, Duct Bank, Cable Trough & Manhole Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the SYS COM conduit, duct bank, cable trough & manhole requirements have been addressed by the INF team.</p>	<ul style="list-style-type: none"> • DCM, 12.14.1, Cable Trough • DCM, 12.14.4, Conduit Risers • DCM, 12.14.5, Embedded Conduits • DCM, 13.15.3, Embedded Conduit and Cable Trough • DCM, 13.15.5, Design Requirements for Cable Troughs • DCM, 28.4.6, Cable Infrastructure • DCM, 28.4.6.4, Cable Infrastructure Physical, Enclosure and Power • DCM, 28.4.6.5, Cable Infrastructure End-Devices • DCM, 28.5.6, Systems Conduits at Track • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.5, Appendix 3.E Fixed Equipment Envelope, Tangent Track • DCM, 3.7.6, Appendix 3.F Fixed Equipment Envelope, Superelevated Track • DCM, 7.7.7, Walkways and Cable Trough • Drawing DD-CO-F002, TYPICAL CONNECTIVITY BETWEEN COMMUNICATIONS SPACES • Drawing DD-CO-F003, TYPICAL CONNECTIVITY AT WAYSIDE SITES • Drawing DD-CO-G021, TYPICAL CROSS SECTION, SYSTEMS LOW VOLTAGE, CONDUIT DUCT BANK • Drawing DD-CO-G022, TYPICAL SECTION, SYSTEMS LOW VOLTAGE, UNDER TRACK CONDUCT DUCT BANK, AT-GRADE • Drawing DD-CO-G023, TYPICAL CROSS SECTION, SYSTEMS LOW VOLTAGE, UNDER TRACK / UNDERGROUND CONDUCT DUCT BANK, AT-GRADE • Drawing DD-CO-G024, TYPICAL CROSS SECTION, SYSTEMS LOW VOLTAGE, UNDERGROUND CONDUIT DUCTBANK INSTALLATIONS, TWO TRACK TRENCH • Drawing DD-CV-001, TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, EMBANKMENT • Drawing DD-ST-001, AERIAL STRUCTURE, TWO TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK • Drawing DD-ST-003, AERIAL STRUCTURE, TYPICAL CABLE TROUGH DETAILS • Drawing DD-ST-004, AERIAL STRUCTURE, CABLE TROUGH DETAILS, AT OCS POLE • Drawing DD-ST-010, TYPICAL CROSS SECTION, FOR TWO TRACK TRENCH, OUTSIDE WALKWAY



ID	Interface	Document Reference(s)
	(continued)	<ul style="list-style-type: none"> • Drawing DD-ST-011, CABLE TROUGH DETAILS, TRENCH / CUT AND COVER TUNNEL • Drawing DD-ST-012, CABLE TROUGH LAYOUT TRANSITION AREAS • Drawing DD-ST-013, TYPICAL CABLE TROUGH DETAILS, EMBANKMENT/CUT • Drawing DD-SY-010, TYPICAL CIVIL ACCOMMODATIONS, SYSTEM SITES • Drawing DD-TC-004, STATION INTERLOCKING LAYOUT-TYPICAL • Drawing DD-TC-005, UNIVERSAL INTERLOCKING LAYOUT-TYPICAL • Drawing DD-TN-113, ATC SIGNALING AND COMMUNICATION SYSTEMS • Drawing DD-TN-300, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT SINGLE TRACK TWIN TBM BORED TUNNEL • Drawing DD-TN-301, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT TWIN TRACK SINGLE MINED TUNNEL • Drawing DD-TN-302, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT TYPICAL CROSS SECTION-TWIN TRACK SINGLE MINED TUNNEL WITHOUT SEPARATION WALL • Drawing DD-TN-303, BASIC TUNNEL CONFIGURATION PRELIMINARY FIXED EQUIPMENT LAYOUT-TWIN TRACK SINGLE BORED (TBM/ CIRCULAR) TUNNEL WITHOUT SEPARATION WALL
	3.4.2.4 Air Gaps	
IF 657	3.4.2.4.1 Interface between SYS COM Air Gap Requirements and GWY Infrastructure	
	Purpose/Scope: Ensures that the SYS COM air gap requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 28.4.1.5, General Communications Systems End-Devices • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.1, Appendix 3.A Structure Gauge, Tangent Track • DCM, 3.7.2, Appendix 3.B Structure Gauge, Superelevated Track • DCM, 3.7.5, Appendix 3.E Fixed Equipment Envelope, Tangent Track • DCM, 3.7.6, Appendix 3.F Fixed Equipment Envelope, Superelevated Track
	3.4.2.5 Dead & Live Loads	
IF 3016	3.4.2.5.1 Interface between SYS COM System Dead Load Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<u>Purpose/Scope:</u> Ensures that the SYS COM system dead load requirements have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • Wayside facilities 	<ul style="list-style-type: none"> • DCM, 28.4.1.4, General Communications Systems Physical, Enclosure and Power • DCM, 28.4.1.5, General Communications Systems End-Devices • DCM, 28.5.2, Communications Interface Cabinets • DCM, 28.5.6.2, Aerial Cable Conduits • DCM, 12.5.1.1, Dead Load (DC, DW) • DCM, 12.5.3.1, Loads for Design of Overhead Contact System Pole Foundation
	3.5 Grounding & Bonding	
	3.5.1 Interfaces with Guideway (excl. Trackwork)	
	3.5.1.1 Systemwide	
IF 4252	3.5.1.1.1 Interface between SYS Conduit, Duct Bank, Cable Trough & Manhole Requirements G&B Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS conduit, duct bank, cable trough & manhole grounding & bonding requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 22.3, General Grounding and Bonding Requirements • DCM, 22.8.1, General Requirements • DCM, 22.10, Grounding Requirements for Raceway, Cable Tray, Underground Ductbanks, and Structures • DCM, 22.11.1, General • DCM, 22.11.4, Facility Power System and Lighting System • DCM, 22.11.5, Cable Trough and Outside Plant • DCM, 12.14.2, Grounding and Bonding
	3.5.1.2 At-Grade	
IF 1141	3.5.1.2.1 Interface between SYS At-Grade G&B Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS at-grade grounding & bonding requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 22.5.12, Fence and Gate Grounding • DCM, 7.8.1.1, Fences • DCM, 7.8.1.5, Gates • Drawing DD-CV-006, FENCE AND GATE DETAILS
	3.5.1.3 Aerial Structures	
IF 4071	3.5.1.3.1 Interface between SYS Aerial Structure G&B Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<u>Purpose/Scope:</u> Ensures that the SYS aerial structure grounding & bonding requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 22.5.3, Grounding and Bonding of Structures - General • DCM, 22.5.4.1, Concrete Structures • DCM, 22.5.4.2, Steel Structures • DCM, 22.5.11, Screen/Noise/Wind/Safety Barriers • DCM, 12.14.2, Grounding and Bonding • Drawing DD-OC-2047, TYPICAL GROUNDING AND BONDING ARRANGEMENT, AERIAL STRUCTURE, 220 MPH SEGMENT
IF 4112	3.5.1.3.2 Interface between SYS New Overpass Structure G&B Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS new overpass structure grounding & bonding requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 22.5.8, New Overpasses • DCM, 22.5.11, Screen/Noise/Wind/Safety Barriers • DCM, 22.6.3, Overhead Contact System • DCM, 12.14.2, Grounding and Bonding • Drawing DD-OC-2046, TYPICAL GROUNDING AND BONDING ARRANGEMENT, GRADE SEPARATED STRUCTURE, 220 MPH SEGMENT
	3.5.1.4 Trench Structures	
IF 4122	3.5.1.4.1 Interface between SYS Trench Structure G&B Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS trench structure grounding & bonding requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 22.5.9, Trenches, Retaining Walls, and Retained Fill Structures • DCM, 22.5.11, Screen/Noise/Wind/Safety Barriers • DCM, 12.14.2, Grounding and Bonding • Drawing DD-OC-2049, GROUNDING AND BONDING ARRANGEMENT, OPEN TRENCH, 220 MPH SEGMENT
IF 5796	3.5.1.4.2 Interface between SYS Cut & Cover Tunnel Structure G&B Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS cut & cover tunnel structure grounding & bonding requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 22.5.10, Tunnels • DCM, 12.14.2, Grounding and Bonding • Drawing DD-OC-2048, TYPICAL GROUNDING AND BONDING ARRANGEMENT, CUT AND COVER TUNNEL, 220 MPH SEGMENT
	3.5.1.5 Utilities	
IF 3999	3.5.1.5.1 Interface between SYS Utility G&B Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<u>Purpose/Scope:</u> Ensures that the SYS utility grounding & bonding requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 22.3.1, General Facility Grounding • DCM, 22.5.13, Third-Party Grounding Interface • DCM, 22.9, Grounding and Bonding Requirements for Facility Power Systems and Lighting Systems • DCM, 22.12, Grounding and Bonding Requirements for Utilities • DCM, 9.5.4.7, Casings • DCM, 9.5.5.7, Overhead Utilities
	3.5.1.6 External	
IF 4107	3.5.1.6.1 Interface between SYS Existing Overpass Structure G&B Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS existing overpass structure grounding & bonding requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 22.5.7, Existing Overpasses • DCM, 22.5.11, Screen/Noise/Wind/Safety Barriers • DCM, 22.6.3, Overhead Contact System • DCM, 12.14.2, Grounding and Bonding • Drawing DD-OC-2046, TYPICAL GROUNDING AND BONDING ARRANGEMENT, GRADE SEPARATED STRUCTURE, 220 MPH SEGMENT
	4 Rolling Stock	
	4.1 HST Trainsets	
	4.1.1 Interfaces with Guideway (excl. Trackwork)	
	4.1.1.1 Track Alignment	
IF 392	4.1.1.1.1 Interface between RST HST Trainset Minimum Radii Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset minimum radii requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • RST Specifications, 2.10, Major Dimensions/Attributes • DCM, 4.4.3, Minimum Radii • DCM, 4.14, Access Tracks to Yards and Maintenance Facilities • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.4.3, Effects of Radius Curvature • DCM, 3.5.1, Effect of Small Radii • DCM, 3.7.2, Appendix 3.B Structure Gauge, Superelevated Track • DCM, 3.7.4, Appendix 3.D Composite Static Envelope and Dynamic Envelope, Superelevated Track • DCM, 3.7.6, Appendix 3.F Fixed Equipment Envelope, Superelevated Track



ID	Interface	Document Reference(s)
IF 489	4.1.1.1.2 Interface between RST HST Trainset Actual Superelevation Requirements (incl. Tilting) and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset actual superelevation requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • RST Specifications, 2.3, Design of Trains (5-01.2) • RST Specifications, 22.1, Static Gauge and Dynamic Envelopes • RST Specifications, 22.3, Dynamic Envelope (SR5-03.1) • DCM, 4.4.5.2, Actual Superelevation • DCM, 3.3.1, Vertical Clearances • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.4.4, Effects of Superelevation • DCM, 3.5.2, Effect of Superelevation on Track Centers • DCM, 3.7.2, Appendix 3.B Structure Gauge, Superelevated Track • DCM, 3.7.4, Appendix 3.D Composite Static Envelope and Dynamic Envelope, Superelevated Track • DCM, 3.7.6, Appendix 3.F Fixed Equipment Envelope, Superelevated Track
IF 395	4.1.1.1.3 Interface between RST HST Trainset Unbalanced Superelevation Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset unbalanced superelevation requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • RST Specifications, 7.10.1, General • DCM, 4.4.5.3, Unbalanced Superelevation
IF 70	4.1.1.1.4 Interface between RST HST Trainset Maximum Grade Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset maximum grade requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • RST Specifications, 10.6, Maximum Gradients (SR 5-03.6) • DCM, 4.5.1, Maximum Grades
	4.1.1.2 Vehicle Static Gauge & Dynamic Envelope	
IF 490	4.1.1.2.1 Interface between RST HST Trainset Static Gauge Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset static gauge requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • RST Specifications, 2.3, Design of Trains (5-01.2) • RST Specifications, 2.10, Major Dimensions/Attributes • RST Specifications, 22.1, Static Gauge and Dynamic Envelopes • RST Specifications, 22.2, Static Gauge (SR5-03.1) • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.3, Appendix 3.C Composite Static Envelope and Dynamic Envelope, Tangent Track • DCM, 3.7.4, Appendix 3.D Composite Static Envelope and Dynamic Envelope, Superelevated Track
IF 481	4.1.1.2.2 Interface between RST HST Trainset Dynamic Envelope Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset dynamic envelope requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • RST Specifications, 2.3, Design of Trains (5-01.2) • RST Specifications, 22.1, Static Gauge and Dynamic Envelopes • RST Specifications, 22.3, Dynamic Envelope (SR5-03.1) • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.7.3, Appendix 3.C Composite Static Envelope and Dynamic Envelope, Tangent Track • DCM, 3.7.4, Appendix 3.D Composite Static Envelope and Dynamic Envelope, Superelevated Track
	4.1.1.3 Aerodynamic Effects	
IF 604	4.1.1.3.1 Interface between RST HST Trainset Aerodynamic Effects and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset aerodynamic effects have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.5.2.7, Slipstream Effects (SS) • DCM, 12.7.1.7, Slipstream Effects from Passing Trains • DCM, 12.8.6.15, Walkways, Parapets, and Sound Walls • DCM, 12.8.8, Emergency Access • DCM, 13.1, Scope • DCM, 13.16.2, Noise Mitigation Hood • DCM, 13.2, Regulations, Codes, Standards, and Guidelines • DCM, 13.3.11, Rolling Stock • DCM, 13.3.12, Aerodynamic Considerations • DCM, 13.4, Tunnel Portals • DCM, 13.4.1, Sonic Booms at Tunnel Portals • DCM, 13.8.6, Aerodynamic forces • DCM, 3.4, Vehicle Clearance Envelopes • DCM, 3.5, Track Center Spacing • DCM, 3.7.1, Appendix 3.A Structure Gauge, Tangent Track • DCM, 7.8.1.2, Walls • RST Specifications, 5.16, Carbody Aerodynamic Provisions • RST Specifications, 5.16.1, Aerodynamic Loads on Track Workers at the Line Side (5-06.3) • RST Specifications, 5.16.3, Pressure Loads in Open Air (5-06.5) • RST Specifications, 5.18, Tables
	4.1.1.4 Loads & Forces	
IF 1073	4.1.1.4.1 Interface between RST HST Trainset Axle Loads and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset axle loads have been addressed by the INF team.	<ul style="list-style-type: none"> • RST Specifications, 2.5, Static Axle Load (5-03.2) • DCM, 12.5.2.1, Live Loads (LLP, LLV, LLRR, LLH, LLS) • DCM, 12.6.6.1, High Speed Train Loading (LLV) • DCM, 13.9.5, Fatigue Analysis • DCM, 9.5.4.5, Placement
IF 3457	4.1.1.4.2 Interface between RST HST Trainset Dynamic Train-Structure Interaction Analysis and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset dynamic train-structure interaction has been addressed by the INF team.	<ul style="list-style-type: none"> • TM 6.1, 3.1.1, ANALYSIS • DCM, 12.6, Track-Structure Interaction • DCM, 12.6.6, Dynamic Analysis using Actual High-Speed Trains • DCM, 12.6.6.1, High Speed Train Loading (LLV) • DCM, 12.6.7.1, Dynamic Train-Structure Interaction Analysis • DCM, 13.9.3, Dynamic Analysis
IF 3180	4.1.1.4.3 Interface between RST HST Trainset Traction & Braking Forces and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset traction and braking forces have been addressed by the INF team.	<ul style="list-style-type: none"> • RST Specifications, 10.4, Mean Acceleration (SR 5-08.1) • RST Specifications, 10.34, Tables • RST Specifications, 11.6, Minimum Braking Performance (5-04.1) • RST Specifications, 11.7, Service Braking Performance (5-04.4) • RST Specifications, 11.29, Tables • DCM, 12.5.2.4, Traction and Braking Forces (LF) • DCM, 12.5.2.4, Traction and Braking Forces (LF) • DCM, 13.9.3, Dynamic Analysis
IF 3185	4.1.1.4.4 Interface between RST HST Trainset Nosing & Hunting Effects and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset nosing and hunting effects have been addressed by the INF team.	<ul style="list-style-type: none"> • RST Specifications, 7.10.10, Design for Vehicle Stability • DCM, 12.5.2.5, Nosing and Hunting Effects (NE)
IF 3227	4.1.1.4.5 Interface between RST HST Trainset Derailment/Collision Loads and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset derailment/collision loads have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • HST structures • Trench structures • Other than station & platform structures • Beyond end of track structures 	<ul style="list-style-type: none"> • RST Specifications, 2.5, Static Axle Load (5-03.2) • DCM, 12.5.2.13, Derailment Loads (DR) • DCM, 12.5.2.14, Collision Loads (CL) • DCM, 12.5.2.13, Derailment Loads (DR) • DCM, 12.5.2.14, Collision Loads (CL) • DCM, 13.9, Structural Analysis
5	Guideway (excl. Trackwork)	



ID	Interface	Document Reference(s)
	5.1 Drainage	
	5.1.1 Interfaces with Operations & Maintenance	
	5.1.1.1 Maintenance	
IF 1260	5.1.1.1.1 Interface between O&M Mol Pump Station Site Access Requirements and GWY Infrastructure	
	Purpose/Scope: Ensures that the O&M Mol pump station site access requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.10.7, Trench Drainage • DCM, 13.15.6, Fencing • DCM, 13.16.21, Parking for Tunnel Maintenance and Traction Power Facility • DCM, 13.16.4.2, Fixed Facility Power • DCM, 13.16.5, Access Road • DCM, 7.7.1.1, Access Roads • DCM, 7.7.5.1, Parking Facilities for Wayside Facilities • DCM, 7.8.1.5, Gates • DCM, 8.6.4, Tunnels • DCM, 8.6.6, Trenches • Drawing DD-CV-006, FENCE AND GATE DETAILS • Drawing DD-CV-007, FENCE AND GATES LOCATIONS • Drawing DD-TN-400, TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE TWIN TUNNEL CONFIGURATION, PLAN • Drawing DD-TN-401, TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE TWIN TUNNEL CONFIGURATION, ELEVATION • Drawing DD-TN-403, TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE SINGLE TUNNEL CONFIGURATION, PLAN • Drawing DD-TN-404, TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE SINGLE TUNNEL CONFIGURATION, ELEVATION • Drawing DD-TN-406, BELOW GRADE PORTAL ARRANGEMENT SHOWING MAXIMUM FACILITIES FOR SINGLE TRACK TWIN BORED TUNNEL -PLAN • Drawing DD-TN-407, BELOW GRADE PORTAL ARRANGEMENT SHOWING MAXIMUM FACILITIES FOR SINGLE TRACK TWIN BORED TUNNEL -PROFILE • Maintenance of Infrastructure, 2, CHST Infrastructure System And Maintainability • Maintenance of Infrastructure, 2.5, Structures • Maintenance of Infrastructure, 9.4, Right of Way Access
	6 External	
	6.1 Shared Rail Corridor	



ID	Interface	Document Reference(s)
	6.1.1 Interfaces with Guideway (excl. Trackwork)	
	6.1.1.1 Intrusion Protection	
IF 1069	6.1.1.1.1 Interface between GWY Railroad Intrusion Protection Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the GWY railroad intrusion protection requirements (prevention of adjacent railroads from entering the HST corridor) have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.10.5.2, Railroad Intrusion • DCM, 12.8.6.3.2, Railroad Intrusion • DCM, 3.3.2, Horizontal Clearances • DCM, 6.3.1, Protection Against Intrusion of Conventional Trains • DCM, 6.3.1, Protection Against Intrusion of Conventional Trains • DCM, 7.8.2.3, At-Grade Trackway Adjacent to Conventional Railroad • Drawing DD-IP-001, EARTHWORK BERM, RAILROAD ADJACENT TO HST • Drawing DD-IP-002, BARRIERS IN SHARED CORRIDOR • Drawing DD-IP-003, HST PIER PROTECTION, IN RAILROAD RIGHT OF WAY • Drawing DD-IP-004, IN SHARED AND ADJACENT CORRIDOR, AT-GRADE • Drawing DD-IP-005, AT-GRADE BERM OR DITCH ON HST GUIDEWAY, RAILROAD ADJACENT TO HST
	6.2 Shared Use Track	
	6.2.1 Interfaces with Guideway (excl. Trackwork)	
	6.2.1.1 Vehicle Static Gauge & Dynamic Envelope	
IF 3759	6.2.1.1.1 Interface between EXT Shared Use Track Trainset Dynamic Envelope Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the EXT shared use track trainset dynamic envelope requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 3.1, Scope • DCM, 3.4, Vehicle Clearance Envelopes
	6.2.1.2 Loads & Forces	
IF 3696	6.2.1.2.1 Interface between EXT Shared Use Track Axle Loads and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the EXT shared use track axle loads have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.5.2.1, Live Loads (LLP, LLV, LLRR, LLH, LLS) • DCM, 12.5.2.1.3, Shared-Use Track Train Live Loads (LLRR) • DCM, 9.5.4.5, Placement



ID	Interface	Document Reference(s)
IF 3668	6.2.1.2.2 Interface between EXT Shared Use Track Trainset Dynamic Train-Structure Interaction Analysis and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the EXT shared use track trainset dynamic train-structure interaction has been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.6, Track-Structure Interaction • DCM, 12.6.8, Modeling Requirements
IF 3252	6.2.1.2.3 Interface between EXT Shared Use Track Trainset Derailment/Collision Loads and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the EXT shared use track trainset derailment/collision loads have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • HST structures • Trench structures 	<ul style="list-style-type: none"> • DCM, 12.5.2.13, Derailment Loads (DR) • DCM, 12.5.2.14, Collision Loads (CL)
	6.3 Amtrak	
	6.3.1 Interfaces with Guideway (excl. Trackwork)	
	6.3.1.1 Vehicle Static Gauge & Dynamic Envelope	
IF 3764	6.3.1.1.1 Interface between EXT Amtrak Trainset Dynamic Envelope Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the EXT Amtrak trainset dynamic envelope requirements have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 3.1, Scope • DCM, 3.4, Vehicle Clearance Envelopes
	6.3.1.2 Loads & Forces	
IF 3706	6.3.1.2.1 Interface between EXT Amtrak Trainset Axle Loads and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the EXT Amtrak trainset axle loads have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.5.2.1, Live Loads (LLP, LLV, LLRR, LLH, LLS) • DCM, 12.5.2.1.5, Amtrak Live Loads • DCM, 9.5.4.5, Placement



ID	Interface	Document Reference(s)
IF 3683	6.3.1.2.2 Interface between EXT Amtrak Trainset Dynamic Train-Structure Interaction Analysis and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the EXT Amtrak trainset dynamic train-structure interaction has been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.6, Track-Structure Interaction • DCM, 12.6.8, Modeling Requirements
IF 3537	6.3.1.2.3 Interface between EXT Amtrak Trainset Derailment/Collision Loads and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the EXT Amtrak trainset derailment/collision loads have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • HST structures • Trench structures 	<ul style="list-style-type: none"> • DCM, 12.5.2.13, Derailment Loads (DR) • DCM, 12.5.2.13.2, Track Side Containment • DCM, 12.5.2.14, Collision Loads (CL)
	6.4 High/Roadways	
	6.4.1 Interfaces with Guideway (excl. Trackwork)	
	6.4.1.1 Intrusion Protection	
IF 1070	6.4.1.1.1 Interface between GWY Roadway Intrusion Protection Spatial Needs and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the GWY roadway intrusion protection requirements (prevention of adjacent roadways from entering the HST corridor) have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.10.5.1, Highway Traffic Intrusion • DCM, 12.8.6.3.1, Highway Traffic Intrusion • DCM, 3.3.2, Horizontal Clearances • DCM, 6.3.2, Protection Against Intrusion of Highway Vehicles • DCM, 7.8.1.2, Walls • DCM, 7.8.1.3, Traffic Barriers • DCM, 7.8.2.2, At-Grade Trackway within Highway Corridor • DCM, 7.8.4.2, Roadway Overpasses Crossing HST Trackway • DCM, 7.8.4.3, Streets Ending at HST Trackway • DCM, 7.8.4.4, Authority Roadways • Drawing DD-IP-006, HST PIER PROTECTION, IN HIGHWAY/ROADWAY RIGHT OF WAY • Drawing DD-IP-007, HST TRENCH AND RETAINING WALL PROTECTION • Drawing DD-IP-008, ADJACENT TO HIGHWAY/ROADWAY



ID	Interface	Document Reference(s)
	6.5 Pedestrians & Wildlife	
	6.5.1 Interfaces with Guideway (excl. Trackwork)	
	6.5.1.1 Access Control	
IF 901	6.5.1.1.1 Interface between GWY Pedestrian/Wildlife Access Control Requirements and GWY Infrastructure	
	<p>Purpose/Scope: Ensures that the GWY pedestrian/wildlife access control requirements (prevention of pedestrians/wildlife from entering the HST corridor) have been addressed by the INF team.</p>	<ul style="list-style-type: none"> • DCM, 3.3.2, Horizontal Clearances • DCM, 7.8, Access Control Devices • DCM, 7.8.2.1, At-Grade Trackway • DCM, 7.8.2.2, At-Grade Trackway within Highway Corridor • DCM, 7.8.2.3, At-Grade Trackway Adjacent to Conventional Railroad • DCM, 7.8.2.4, At-Grade Trackway through High-Risk Trespassing Areas • DCM, 7.8.2.5, Trackway in Cut or Fill (Embankment) Section • DCM, 7.8.2.6, Trackway on Aerial Structure • DCM, 7.8.2.7, Trackway on Retained Fill • DCM, 7.8.2.8, Trackway on Retained Cut (Open) • DCM, 7.8.2.9, Trackway Underground (Bored, Mined, and Cut-and-Cover Tunnels) • Drawing DD-CV-001, TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, EMBANKMENT • Drawing DD-CV-002, TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, OPEN CUT • Drawing DD-CV-003, TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, RETAINED FILL • Drawing DD-CV-004, TYPICAL CROSS SECTION, ONE TRACK NON-BALLASTED, EMBANKMENT AND OPEN CUT • Drawing DD-CV-005, TYPICAL CROSS SECTION, FOUR TRACK NON-BALLASTED, EMBANKMENT • Drawing DD-CV-006, FENCE AND GATE DETAILS
	6.6 Construction Equipment	
	6.6.1 Interfaces with Guideway (excl. Trackwork)	
	6.6.1.1 Loads & Forces	
IF 3701	6.6.1.1.1 Interface between EXT Construction Equipment Axle Loads and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<u>Purpose/Scope:</u> Ensures that the EXT construction equipment axle loads have been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.4.1, Structural Design Parameters • DCM, 12.5.2.1, Live Loads (LLP, LLV, LLRR, LLH, LLS) • DCM, 12.5.2.1.4, Maintenance and Construction Train Live Loads: Cooper E-50 Loading (LLRR) • DCM, 12.5.3.3, Construction Loads and Temporary Structures • DCM, 12.8.5.3, Crack Control • DCM, 9.5.4.5, Placement
IF 3673	6.6.1.1.2 Interface between EXT Construction Equipment Dynamic Train-Structure Interaction Analysis and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the EXT construction equipment dynamic train-structure interaction has been addressed by the INF team.	<ul style="list-style-type: none"> • DCM, 12.6, Track-Structure Interaction • DCM, 12.6.8, Modeling Requirements

Interoperability Items Abbreviation Legend

Abbreviation	Definition	Abbreviation	Definition
ATC	Automatic Train Control	Mol	Maintenance of Infrastructure
BoD	Basis of Design	MTC	Maintenance
COM	Communications	O&M	Operations & Maintenance
ConOps	Concept of Operations	OCS	Overhead Contact System
DCM	Design Criteria Manual	PHA	Preliminary Hazard Analysis
EXT	External	RST	Rolling Stock
G&B	Grounding & Bonding	SAF	Safety
GEN	General	SYS	Systems
GWY	Guideway	TCC	Train Control & Communications
HST	High Speed Train	TP	Traction Power
INF	Infrastructure		

